THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXII. No. 1591.] LONDON, NOVEMBER 7, 1893. [45TH YEAR. PRICE 6d.

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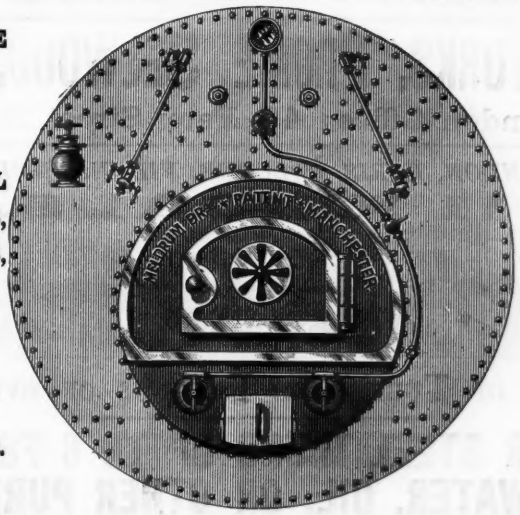

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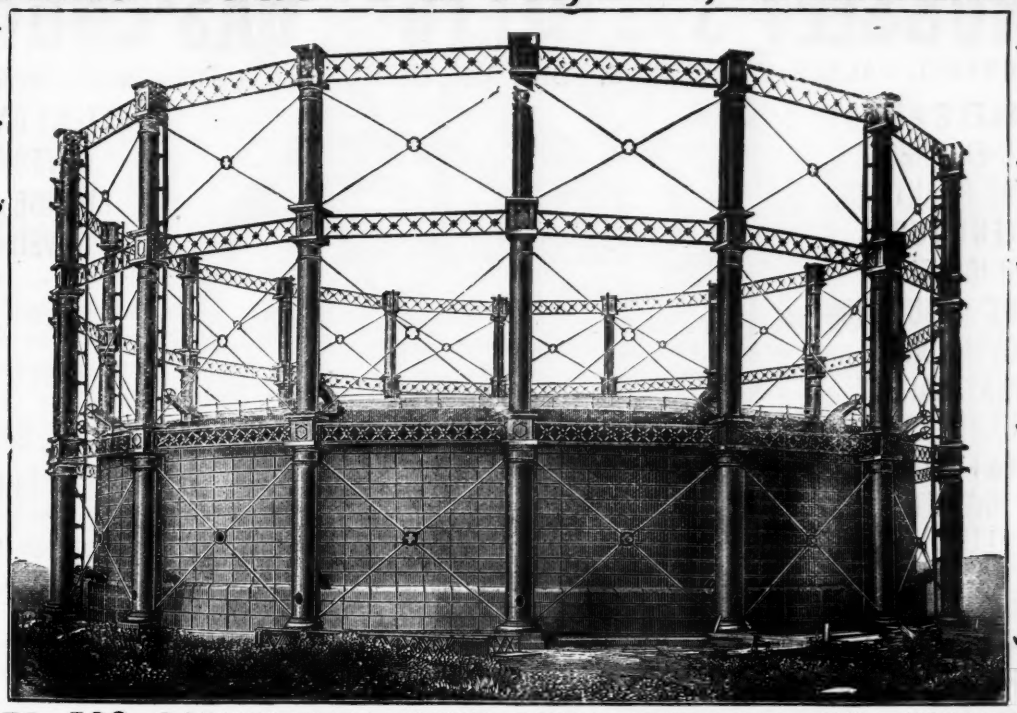

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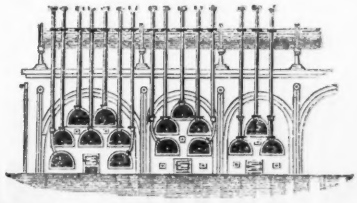

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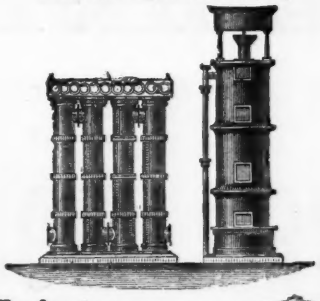

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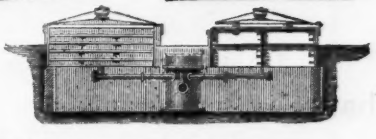

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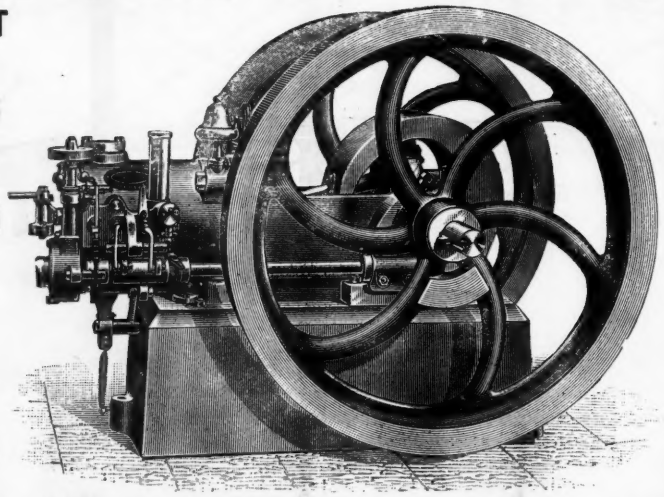

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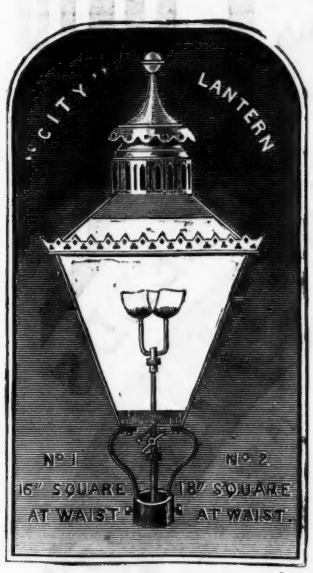

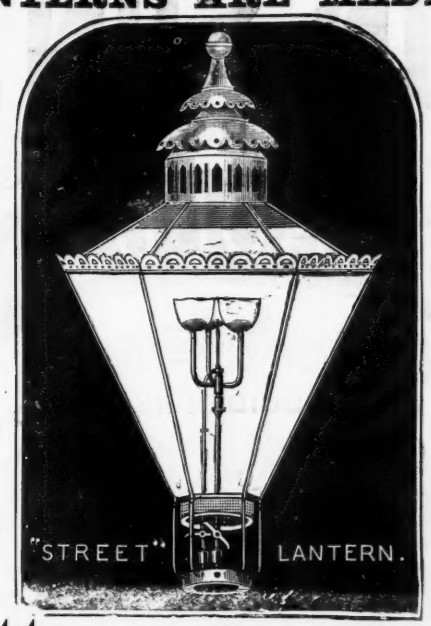

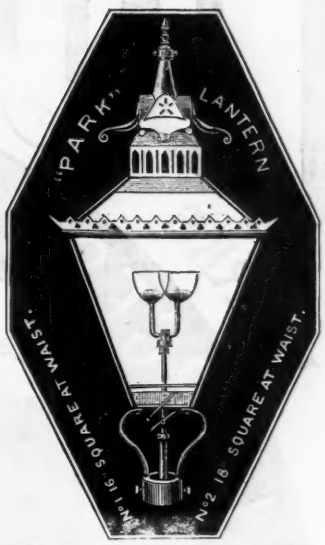

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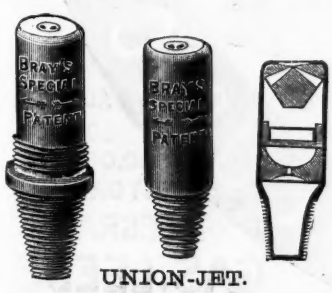

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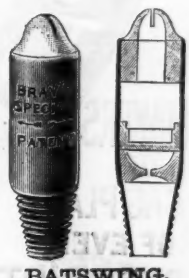

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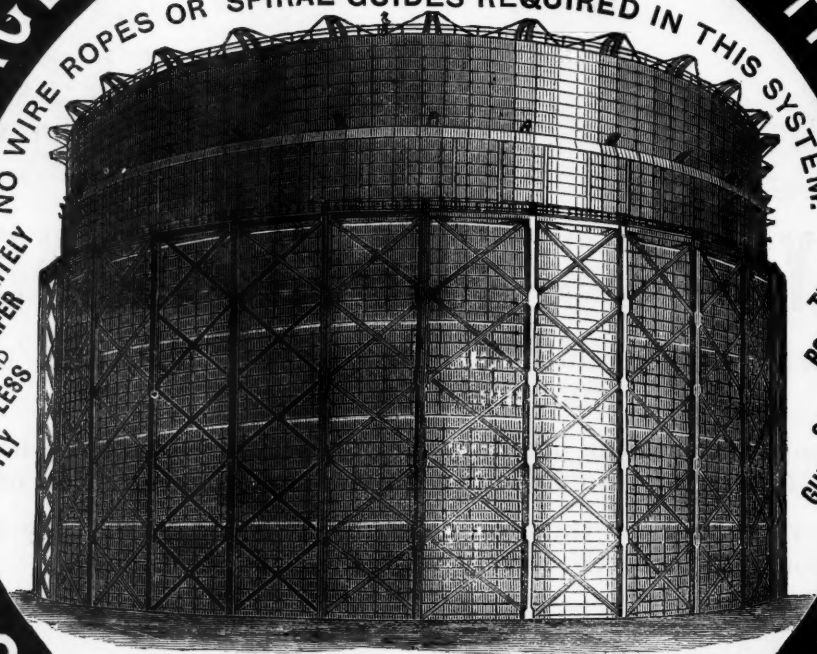

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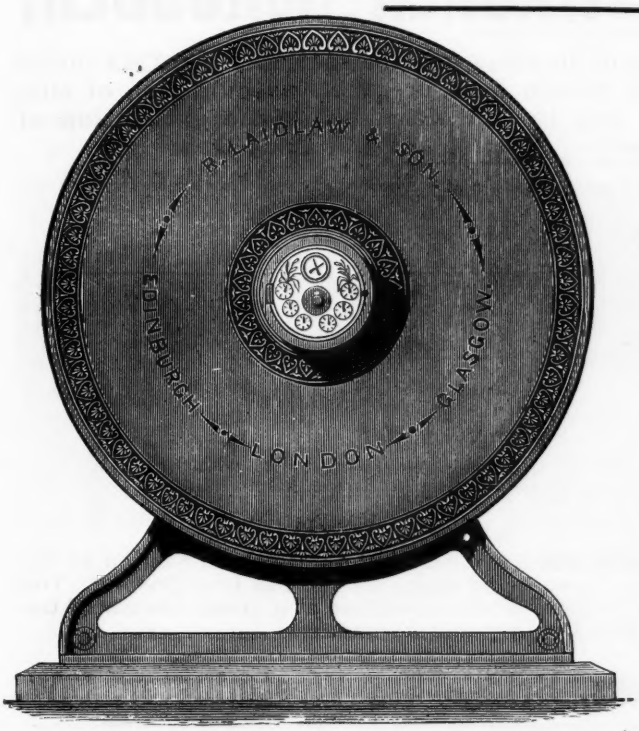

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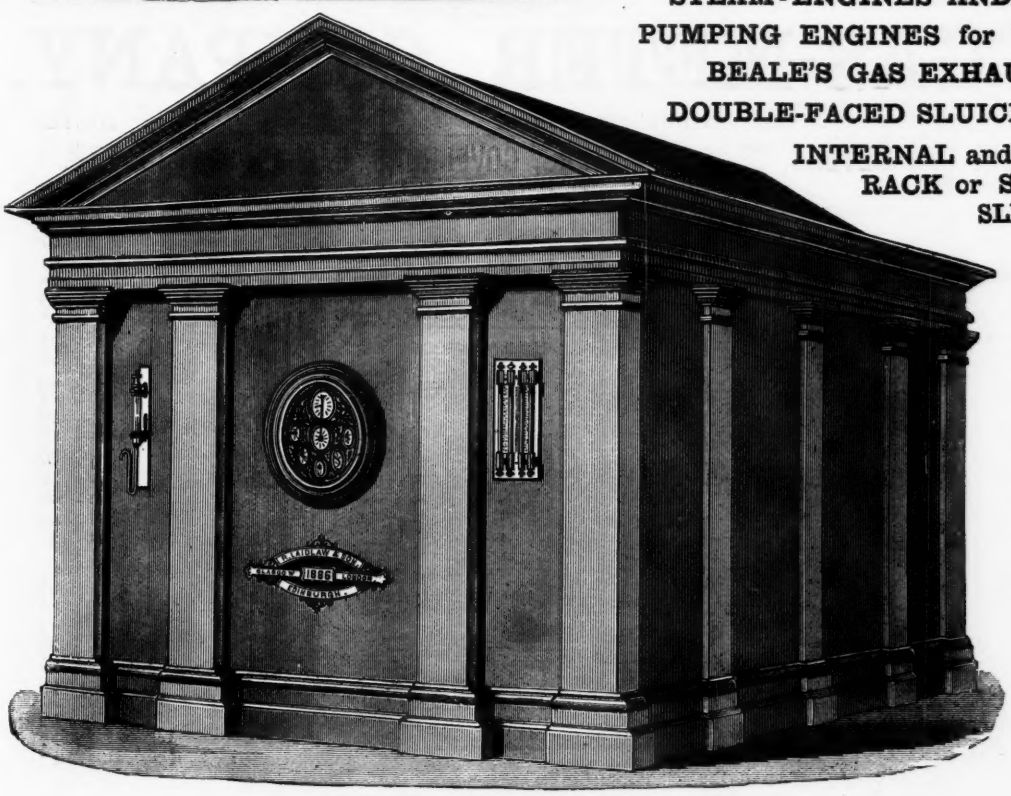

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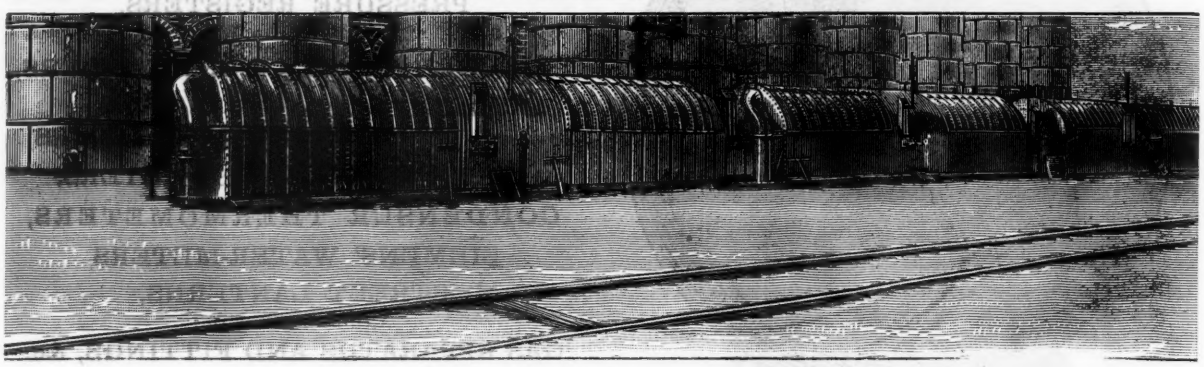

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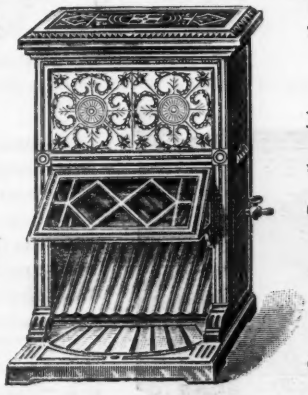

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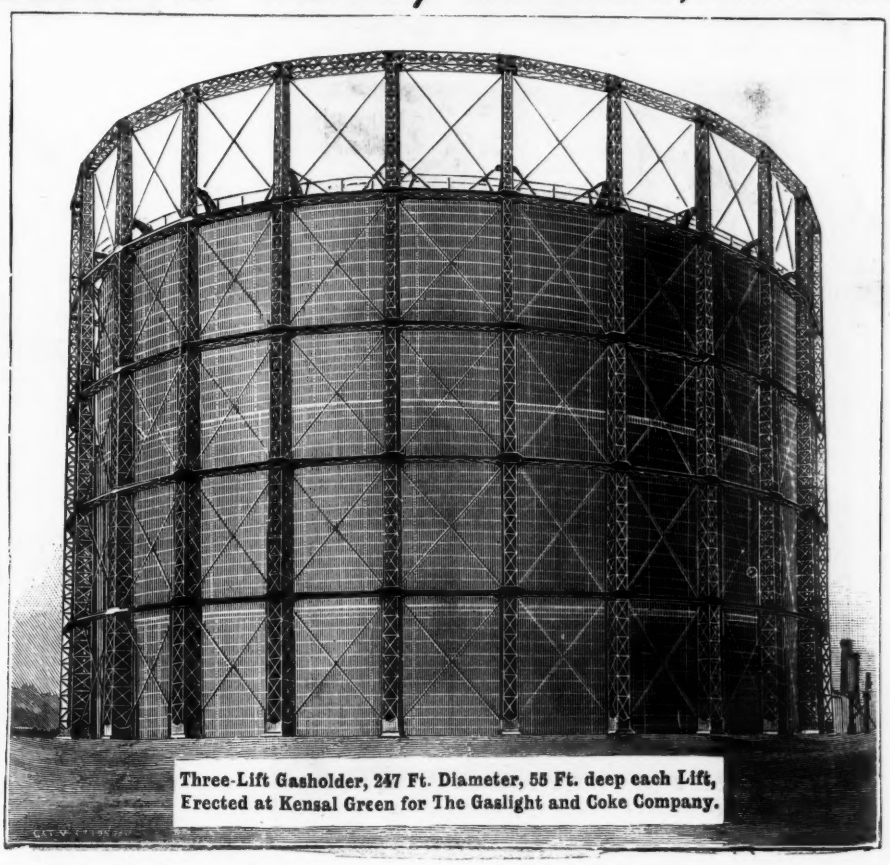

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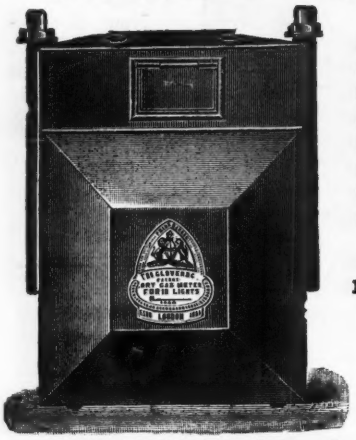

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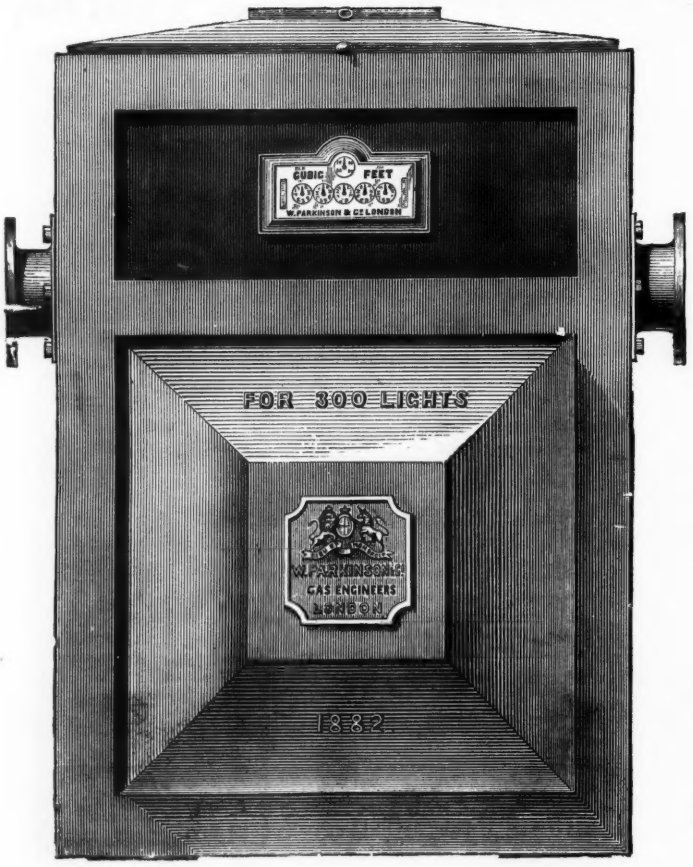

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TO CORRESPONDENTS.

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THE
JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 7, 1893.

Failure of the Coal Trade Conference.

To the great disappointment of the public, the conference of the associated colliery proprietors and the representatives of the Miners' Federation, from which so much was expected, broke up on Saturday without coming to any settlement of the question as to how work is to be resumed. Since the negotiations lasted] for two days, it is to be presumed that those who took part in them were inspired not only by a desire to put an end to the deplorable dispute which is paralyzing the trade, but also with a reasonable hope that means might be found for so doing. The gathering was a representative one; and the failure of a meeting so fairly constituted to deal satisfactorily with the immediate issue, is little short of a national calamity. As on previous occasions of a similar nature, Mr. A. M. Chambers was invited to take the chair; and his first words addressed to the meeting made it clear that the deliberations of the assembled delegates were to be unprejudiced by anything that had previously been advanced by either side. After Mr. Chambers had thus spoken, and had thrown out the suggestion that the formation of a Conciliation Board might be a solution of the deadlock, Mr. B. Pickard, M.P., for the men, declared that their suggestion was that they should first be allowed to resume work at the old rate of wages. This, as Mr. Chambers remarked, meant standing to the old conditions entirely; and there is, in truth, little more to be said concerning the whole affair. The men never budged an inch from their determination not to accept any reduction for the present; and the employers went no further than offering to pay the amount of a 15 per cent. reduction into a special bank account, to be awarded to either party eventually, according to the finding of an Arbitration Board. The latter proposition was rejected; and the only suggestion offered on the part of the men by way of compromise was that a minimum rate of wage should be henceforth fixed at 30 per cent. above the standard of 1888, and that there should be no question of reducing the rate before next April. There is no real yielding in this so-called offer. The worst of the case is that the conference had to be broken up in a hurry, to avoid mutual recrimination. It is a great pity; and, unhappily, there is not much comfort to be found in the fact that the conference was not absolutely fruitless, inasmuch as the employers' offer to arbitrate and bank the 15 per cent. pending the award is to be submitted to a vote of the men. There is small hope that the men will go in upon these terms, as everything their leaders can do to prevent them will be done. Yet the acceptance of this solution of the deadlock would put to the proof in the most incontestable way the difference between the employers and the men's leaders respecting the significance of the present inflated value of coal. Mr. Pickard bids the masters look at the market prices, and dares them to say they could not afford to pay the old rate of wages at such values. Mr. Chambers retorts that these prices are not going into their pockets; and he declares that they are purely artificial, and will disappear the moment work is resumed generally.

It is obvious that the men would lose nothing by accepting the masters' offer; but their leaders would lose a great deal. They have pinned themselves to the task of forcing the employers to accept their after-thought of a "living wage;" and they will let their supporters starve sooner than abandon the impossible attempt to bind the coal-mining industry in a bond which does not apply to any other occupation in the world. As the exponent of the New Political Economy in the Daily Press puts it: "The coalowners could not or would not accept the principle of a living wage. They are determined to fight on "in order to maintain the right to squeeze the collier first "of all when they have made contracts at cut-throat prices. "The royalty owner, the landlord, the railway company, "the shareholder, the director, are to get off scot free; "but the earnings of the collier who does all the work, "and does it every day with his life in his hand, are to be "at the mercy of his master." This style of treating the question is very pitiable. Coalowners would doubtless be well pleased to regard wages as a fixed charge upon the cost of coal getting, if everybody in the trade did the same; but to blame the Midland, Yorkshire, and Lancashire colliery proprietors for declining to submit to a condition with regard to wages which does not apply to their commercial rivals, is palpably absurd. Yet, unfortunately, men have not learnt the unwisdom of fighting about absurdities. Some of the most desperate conflicts of which history bears record have been started, and kept up to the exhaustion of one or of both sides, over differences which appear to

later critics to have been ridiculously inadequate to cause such commotion in a world of reasonable men. It is remarked by *The Times*, with reference to the offer of the employers which at the present time stands open for the men's acceptance or rejection, that it "will strike "most people as a singularly full and complete "reference of the whole dispute to the arbitrament of an "impartial tribunal." Public opinion, however, has no such power of "getting at" the miners as is possessed by their delegates; and we have no hope that the latter will drop their economic heresies, and allow the question to be settled as a pure matter of business. We could wish the employers had begun their campaign in the same way that they have now taken in the hope of finishing it. No such terrible dislocation of the trade of the country would have followed the present suggestion as was instantly brought about by the original intimation; but coalowners, like other people, must live and learn. The worst of it is that experience, though a splendid teacher, is not only very costly, but the school fees do not always fall to be paid by the right people.

A Curious Inquiry at Keighley.

In another column will be found a report of a curious inquiry which is being held by Mr. J. Waugh, of Bradford, as "arbitrator," into certain points of the management of the Keighley Corporation Gas-Works. The matter arose in this way: Early in the year there was some trouble with the men employed at the works, and a foreman named Hall was discharged. This was enough to create a little "feeling" in the town; and at the April meeting of the Town Council, Mr. John Laycock, the Manager of the works, was questioned upon the subject. His statements on this occasion drew from the discharged foreman a letter to the local newspaper, wherein numerous allegations were made against Mr. Laycock. Among other remarkable indictments of the management, the letter contained an offer to show the Gas Committee "machines "on the works which were employed for pumping air into "the gas," and of the existence of which they were not aware. In consequence of this, Mr. Laycock at once commenced an action for libel against Hall; but afterwards the matter was, by mutual consent, referred to the arbitrament of Mr. Waugh, who has taken evidence, and is now reported to be considering his award. We are bound to take notice of this matter, as an incident of the times; but though there is nothing legal about Mr. Waugh's position, we shall allow him to have the first say on the merits of the case presented to him. Nevertheless, we must now put upon record an emphatic protest against the whole affair. If the Keighley Gas Manager had been in the service of a Company, and had only his Directors to satisfy, nothing of the kind would have happened. As it is, Mr. Laycock is a public official, and is consequently a mark for all the local demagoguery to shoot at. He is bound to defend himself against attacks which, if once allowed to pass unnoticed, would be treated as true by the next candidate for election to the Town Council who thought fit to truckle to the "Labour Party." All the same, having appealed to the law to protect him, it is to be regretted that Mr. Laycock did not keep his ground. We do not blame him personally for bowing to reasons which we are ready to believe, without knowing them, showed the desirability, in the circumstances, of the course actually taken. But, in the interest of the large number of gas managers who might any day be placed in a similar position, we emphatically declare that their defence from libel and slander must be that given them by the law. These things are not for arbitration. It is altogether different when the management of a gas undertaking is attacked on general grounds, and when there is no question whatever of the good faith of the Manager. Then an appeal for inquiry into the circumstances by some qualified authority is quite in order; and such a proceeding is competent to determine the issue. Personal libels belong to a different category; and all inquiries into such questions should be hedged round by the safeguards of judicial procedure. The Keighley matter is perhaps only a small one, having regard to the purely technical issues. Its real importance lies in its bearing upon individuals; and no mere arbitrator can protect personal interests. It is therefore to be hoped that this incident will remain altogether exceptional, and not be pleaded as a precedent for similar cases that may occur in the future.

The House of Commons and the Employers' Liability Bill.

It looks very much as if the Government will not have very great difficulty in making progress with the Parish Councils Bill; and accordingly more political interest is being manifested in the Employers' Liability Bill, the report stage of which will be taken this week. It is remarked that nobody knows how long this stage will last; and it is equally impossible to predict what may happen to the Bill until some indication has been given of the intention of the Government with regard to the crucial questions of contracting out and the treatment of British ships in foreign ports. The Labour members, who assume to speak for the Trades Unions, and who have no personal interest at all in the matter, are believed to be urging the Government to stand by the Bill as it is, and assuring them that if they do they will come off victorious. On the other hand, the Labour members are not quite so numerous or so influential as they would like to be; and even the Trades Unions do not represent more than one-tenth of the working-class population of the country. Mr. Asquith has said something about the "contracting-"out" question not being a mere pecuniary matter, and has declared it to be "a matter of public interest that "workmen should not be permitted by contract to relieve "the master of the responsibility of taking due pre-"cautions for the safety of the lives and limbs of those "whom he employs." This is all very well; but the consideration that weighs with tens of thousands of workmen, who look at the question not from the point of view of a politician, but from that of men who may any moment feel the operation of the arrangements referred to, is that the proposed alteration of the law will do them more harm than good. The London and North-Western Railway men will not have the Government Bill at any price; and their vote is something which practical politicians have to reckon with. Mr. M'Laren has put upon the paper notice of a motion proposing the addition to the Bill, after clause 2, of a new clause which is too long to quote here, but may be taken as fairly covering the contention of the railway and similarly protected men. As an amendment to Mr. M'Laren's proposed new clause, Mr. Dodd has suggested that contracting out shall be permissible only in cases where the employers are statutory companies, and where the contract has been entered into before the passing of the Bill. This modification is rumoured to be favoured by a section of Ministerialists as a fair specimen of that compromise between opposing principles of which the House of Commons mind is so fond. It would not, however, meet the case; for though it might satisfy the Railway and Gas Companies' men, it would leave out in the cold the prospective beneficiaries of such non-statutory institutions as the Elswick Works Accident Compensation Fund. The Secretary of this fund has published a long letter on the subject to working men; arguing that it is quite possible to so frame the Bill as to cut out fraudulent and oppressive contracts, and retain those that are beneficial to the men. This would appear to be the natural solution of the difficulty.

Municipal Politics.

Parliament has met again, ostensibly, and according to the established phrase, "for the despatch of business." It will soon appear whether or not this time-honoured locution is to be once more a mere figure of speech. During the last days of the recess, the Right Hon. H. H. Asquith, the Home Secretary, who has been styled in some quarters, rather invidiously, the "show boy" of the Ministry, has been going about making speeches. He has said a good deal about subjects connected with the working of his own Department, as we observed in these columns a fortnight ago. Since then he has spoken at Leeds; and it is with regret, but not with surprise, that we have noticed how certain newspapers have gibed at the right honourable gentleman for making what are contemptuously described as "gas-and-water speeches." It would be vastly better for the country if the public in general, including the newspapers which usurp the right of minting what passes current for public opinion, were more interested in these "gas-and-water" subjects, which are, in other words, among the principal concerns of practical statesmen. Yet the very newspapers that affect to turn with weariness from the utterances of a statesman referring to matters of the highest practical importance to the community, howl with equally affected indignation if the same speaker ventures

to talk what these critics call "sentimental politics." Let a statesmen in or out of office talk of Utopia or of drains, he will equally offend half the people to whom his remarks are addressed.

To return to the particular case of Mr. Asquith, however, it must be conceded that, amid a good many platitudes, those portions of his Leeds address which referred to the work of Municipal Corporations contained some wise and helpful observations. There is a very great deal that is unlovely, irritating, and disappointing in the every-day working of the average British municipality; and there is small satisfaction in the thought that these bodies are certainly no worse, even if they are little better, than similar institutions elsewhere. Any number of blacks do not make one white; and the colour of many British Municipal Corporations is certainly shady, when viewed in some lights. It is not at all difficult to agree with the Home Secretary in a general way, when he points to the measure which gave local self-government to our towns as having been justified by its fruits. It is with less reserve that one can join him in uttering the warning to which this complimentary review of the broad results of the Municipal Corporations Act of 1835 led up—that a very great responsibility rests upon those to whom, through that legislation, the management of their own local affairs has been entrusted. He was entirely right, moreover, in his further remark that "it is only by bringing to bear "upon municipal contests the same organization, the "same wealth and exuberance of interest and contro-"versy . . . which we experience in the larger "world of Imperial politics, that you can expect purity "of administration, and that you can obtain for your-"selves the services of the best and worthiest among "your fellow-citizens." This is what is wanted—the selection of the best men for the work of government; and the system of choice which implicates the greatest number of participants in the task of selection is likely to bring about the best results. Mr. Asquith had something to say about municipalities as employers of labour; and he remarked upon this head that "there is no greater "problem before either the central or the local govern-"ment of the United Kingdom at this moment than the "question how, in so far as in them lies, in their relations "with those who depend upon them for their wages, and "who spend their lives in their service, to set up a high "standard of social and of moral duty." The weakest part of Mr. Asquith's speech was perhaps the assumption which he ventured to put forward that all these grand and noble ideals are the property of one party in the State. If this were even approximately true, it would be a bad prospect for the country.

The chief hope of Municipal Corporations against the possibility—which should never be lost sight of, however rarely mentioned—of their sinking into the depths of corruption, lies in their membership continuing to be drawn from among the best men available in the locality. This result can only be ensured by the maintenance among the inhabitants of every town of the feeling of pride in their Municipality which the tradition of local patriotism has done so much to create. Again, the election of members of Gas and Water Committees upon the lines of party politics may, and does, appear anomalous on the face of it; but what does it matter, so long as the men are good, and are not "faddists"? One of the noteworthy features of the municipal elections that have just taken place is the ineffectual attempt of the "Labour" candidates to make a breach in the solid phalanx of either of the two great political parties. This is something to be thankful for—not because the result is a slight to the cause of Labour, for it is nothing of the kind, but because it shows that class representation is not popular in this country. So long as men of all ranks and orders in the community take their part in the duty of self-government, the machine politician will have no foothold in our midst.

Southern District Association of Gas Engineers and Managers.—We are asked by the Honorary Secretary of this Association (Mr. J. W. Helps, of Croydon) to notify that the next meeting will take place at the Holborn Restaurant on the 23rd inst. The November meeting is usually held on the second Thursday in the month; but as this will be Lord Mayor's Day, it has been thought that it would be more convenient to the members to postpone it for a fortnight. Special interest will attach to the meeting, as we understand Dr. Thorne intends to read a paper on the hydro-oxy oil gas process.

WATER AND SANITARY AFFAIRS.

THE cases of lead-poisoning which have occurred in the town of Mossley have undoubtedly been very numerous; and it should be a source of satisfaction to all persons concerned that at length a Local Government Board inquiry has been held, for the purpose of accumulating evidence, and tracing, if possible, the cause of the mischief. The consensus of opinion of the witnesses, as mentioned in the JOURNAL last week, was that lead-poisoning in the district was due not so much, if at all, to the quality of the water, as to the defective nature of the service-pipes. If this be so, then clearly, on the authority of the well-known case of *Milnes v. The Huddersfield Corporation* (which occupied the Courts at intervals for four years), it is a matter which rests in the hands of the consumers themselves. Suppliers of water, it is true, are bound, by the Water-Works Clauses Act, 1847, to provide and keep in their pipes a supply of pure and wholesome water; but if the water is pure and wholesome in the mains or pipes, and if the best means of connecting the mains with the consumers' houses have been adopted, a company or a corporation will not be liable for injury sustained by the customer owing to the water becoming contaminated in its passage through the service-pipe to his premises. Our readers will remember that an imposing array of judicial talent was devoted to the decision in the Huddersfield case. In the first place, the action came before Mr. Justice Mathew. It then went to the Court of Appeal—consisting at that time of Lord Coleridge, the present Master of the Rolls, and Lord Bowen; and in its next, and final, stage it was disposed of by the House of Lords, when Lords Blackburn, Bramwell, Fitzgerald, Halsbury, and Ashbourne affirmed the judgment of Mr. Justice Mathew and the Court of Appeal—Lord Selborne and Lord Watson, however, dissenting from the opinion of their colleagues. The principle laid down in the Huddersfield case applies, of course, at Mossley, or in any other district in which, under similar conditions, lead-poisoning may unfortunately occur. It is quite conceivable, however, that an agitation might some day be set on foot, with the view of extending the responsibility of the suppliers of water, on the theory suggested by Lord Selborne. "I cannot be "persuaded," said his Lordship, "that the statutory "obligation of the Corporation is fulfilled if they deliver "into those [lead] pipes water containing foreign or "adventitious matter . . . which, in passing through "them, will cause the water to take up lead, and so "become poisonous in a way which, otherwise, would "not have happened." This view did not commend itself to nine out of the eleven Judges, of one grade or another, who had to deal with the case; and it is remarkable that only to his Lordship and to Lord Watson did it occur to regard as of little importance the fact that the service-pipe in which the mischief arose did not belong to the Corporation. If, however, strengthened by the opinion expressed by this small minority of the Law Lords, an extension of lead-poisoning should lead to an attempt by some ambitious member of Parliament to alter the law, Water Companies, in repelling the attack, will occupy a position of unusual strength, because it will be in the interests of a great many powerful Corporations to fight with, instead of against them.

A bulky supplement to the Twenty-first Annual Report of the Local Government Board was issued last week; being a continuation of the report of the Medical Officer for 1891. The volume is an important one, containing a number of coloured maps and diagrams, together with some perspective views, and consists of Dr. Barry's report to the Board in respect to the prevalence of enteric fever during 1890-91 in certain sanitary districts in the valley of the Tees in South Durham and North Yorkshire. Two outbreaks of fever are thus considered; one having occurred in September and October, 1890, and the other in January, 1891. The epidemic of 1890 was dealt with, in the first instance, by a report drawn up by Dr. Barry, as Medical Inspector, and published in the supplement to the Twentieth Annual Report of the Local Government Board; the occurrence of the fever being attributed to the consumption of water taken from the Tees, and delivered, after filtration, by the Darlington Corporation and the Stockton and Middlesbrough Water Board. The same view is maintained in the later and fuller report of the Inspector now issued, which deals exhaustively with both outbreaks, and attributes them

to a common cause. While the Royal Commissioners on the Metropolitan Water Supply were conducting their recent inquiry, their attention was called to these fever outbreaks in the valley of the Tees, by some of the witnesses who appeared before them, especially those who were connected with the London County Council. Hence the Commissioners were induced to go into the subject more fully, so as to render the investigation on this point, so far as they were concerned, as complete as they could. We remarked at the time that we thought the Commissioners—although prompted by a laudable desire to act impartially—were travelling somewhat out of their sphere in dealing with a question locally affecting so remote a point as the valley of the Tees. The close of the proceedings was somewhat delayed by the reception of this extra evidence; but the result leaves little to regret. The Commissioners had the advantage of receiving advance copies of the Local Government Board report which has just been issued; and it is interesting to compare Dr. Barry's statements with the views expressed by the Royal Commissioners, as given in their report issued only a few weeks ago. The Commissioners directed their attention more especially to the epidemic of 1890; and they observed that the propositions laid down by Dr. Barry constituted "a formidable indictment against the "water supply." But they went on to mention that these several propositions were one and all traversed by Mr. Wilson, the representative of the Stockton and Middlesbrough Water Board. It was Dr. Barry's contention that a flood which happened on Aug. 13, 1890, swept into the Tees a great quantity of filth which had accumulated on the banks of the river above the intake of the supply, and that this pollution gave rise to the subsequent outbreak. To this it has been replied that the banks had been scoured by a previous flood, and that in the interval there had been no traceable case of enteric fever above the intake.

There is much significance in the remarks made by the Royal Commissioners respecting these fever outbreaks in the valley of the Tees. Admitting that they are not in a position to decide between the conflicting opinions laid before them, the Commissioners feel justified in expressing their surprise at the idea that the pollution on a given day of a river like the Tees, with a flow in time of flood of at least 1000 million gallons in the 24 hours, by what must at most have been a very small amount of active enteric poison, at a point 17 miles above the intake, should so seriously affect the water that the admission of a certain limited quantity of it into the reservoirs should produce, notwithstanding filtration, an extensive outbreak lasting for some six weeks. This conclusion which Dr. Barry seeks to establish is described by the Commissioners as "a hypothesis so startling, and so entirely unsupported "by previous experience in other places," that they consider it fair to demand the most conclusive evidence before accepting it as proven. Attaching, as they do, great importance to the opinion of such an experienced Inspector as Dr. Barry, the Commissioners yet say that, in their judgment, "such conclusive evidence" as the case demands has not been brought before them. But, as might be expected, the opinion of Dr. Thorne Thorne, expressed in the introduction to the present volume, runs contrary to that of the Royal Commissioners. The head of the Medical Department thoroughly endorses the views expressed by his Inspector, and uses language of the most positive kind, saying: "Seldom, if "ever, has the case of the fouling of water intended for "human consumption, so gross or so persistently maintained, "come within the cognizance of the Medical Department; "and seldom, if ever, has the proof of the relation of the "use of water so befouled to wholesale occurrence of "enteric fever been so obvious and patent." Dr. Thorne, we fancy, must have penned this sentence as a direct rejoinder to the remarks of the Royal Commissioners. Yet the Commissioners had before them the very same facts as those on which the declaration of Dr. Thorne is based; and it becomes a reasonable inference that, if Lord Balfour of Burleigh and his colleagues were not convinced, the case can scarcely be so clear as Dr. Thorne conceives it to be. In one respect, the authorities of the Local Government Board are enabled to make a smart hit at the present order of things. They show that the Corporations of Stockton and Middlesbrough, having obtained possession of the water supply on the plea that they would draw from a purer source than the river, were still drawing from the Tees at the date of the recent epidemics, despite all their former protestations. The argument is a good one for the Local Government Board, though in reality it proves nothing, except a certain amount of crookedness on the part of the Local Authorities.

In *The Times* of yesterday, a long leading article gives support to the views expressed by Dr. Barry regarding the Tees epidemic; but while differing from the Royal Commissioners on this point, it is admitted that the latter were fully justified, by the light of experience, in saying that no consequences similar to those in the Tees Valley had been observed in the case of the Metropolis. It is suggested that the difference may partly depend on the degree of pollution; but it may also be due to the fact that there is a filtration which affords safety, and one which does not. The immunity of Altona from cholera, when receiving filtered water from the highly-polluted Elbe, is referred to, as reported upon by Dr. Koch.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 860.)

THE course of business on the Stock Exchange during the past week has been rather colourless. No pronounced movement either way was perceptible, though there were slight periodical fluctuations, which were almost immediately taken advantage of, and so were arrested. At the opening, a fair show of some inclination to firmness was apparent; and the balance of incidents of the week should have induced a rise in prices—embracing, as it did, the triumph of the anti-silver party in the United States, the fair promise of a settlement of the coal strike, and the intelligence that the operations in our little war in South Africa had so far been favourable. But, in spite of this, business remained very quiet; and the general disposition was to wait a little longer before committing oneself. The Foreign Market, too, was in a very bad way, and was of itself sufficient to enjoin caution. The Money Market is, on the whole, unchanged; the anticipated withdrawal of gold for America not having attained any proportion. The Gas Market has again been decidedly quiet; and the tendency to weakness, which was apparent a week ago, still prevails. With the exception of a slight advance among the preferential issues, all the changes in quotation are for the worse. The retrograde movement is not confined to any one class of undertaking, but affects Metropolitan, Suburban, Provincial, and Foreign Gas Companies alike. Gaslight "A" lost ground to about the same extent as it did in the previous week, and closed with a "special" mark of 222—the lowest price. The secured issues were steady; and the "J" 10 per cent. advanced a point. South Metropolitans were quiet and unchanged; being as firm as anything in the list. Commercials betrayed weakness; the old stock receding 1, while the new changed hands at a very moderate figure. Among the Suburban and Provincial Companies, Brentford fell back 2; and Brighton and Hove was 1 lower. The Continental undertakings were quiet, and not very strong generally; while Imperial sustained a further fall of 3. The quotation of Cagliari was drawn in closer to a margin of 1; but no business was induced. None of the rest presented any noticeable feature. The general depression extended as far as the Water Companies. Not much business was transacted in any; but the prices marked were below the average figures for the most part, while East London and Kent lost 1 each off their quotations. The only issue which changed hands at a good price was Southwark and Vauxhall ordinary, which has not unfrequently hitherto taken a line of its own. Water debenture stocks were not dealt in.

The daily operations were: At the opening of the market on Monday, signs of a tendency to weakness were at once apparent; Gaslight "A" falling 1½. The secured issues, however, were firm, and fairly active; "J" showing an advance of 1. Business was slight in other undertakings; but prices generally were steady, though Brighton receded 1. On Tuesday, business was almost at a standstill; not half-a-dozen bargains being marked all day. Prices were still lower, with another fall of 1½ in Gaslight "A," and of 2 in Imperial Continental. East London Water fell 1. Wednesday was a close holiday. Thursday was extremely quiet; and prices generally were rather poor. Brentford new receded 2. Friday was more active; but still the course of quotations was downward—Commercial old and Imperial Continental falling 1 each. Kent Water also lost 1. Saturday was about as quiet as usual; and all quotations closed without further variation.

ELECTRIC LIGHTING MEMORANDA.

Consumers' Complaints of the Electric Meter System—The Lighting of Workshops—The Use of Electrical Appliances in America.

MUCH discontent has been caused in several towns in different parts of the kingdom by the consequences of the introduction of consumers' meters by electric lighting companies that started in business upon the rental system. This remark applies especially to the small Massingham ventures in the south-west

of England. These companies secured their connection in the first place by engaging to supply incandescent lamps at a uniform rental of 1s. per candle per annum. So long as this arrangement lasted, consumers were fairly contented; and a considerable number of shops, clubs, &c., patronized the electricians. The annual charge of 16s. for a 16-candle lamp did not hurt anybody. As might be supposed, the conditions were not so favourable for the suppliers of the electricity used in this way; and therefore, as soon as meters could be had at a reasonable cost, the lighting companies took the earliest opportunity of terminating their rental contracts, and required their customers to pay in future by measurement. This alteration was not at once objected to; for nobody knew what the result of the change would be. It soon appeared, however, that the meters would make a vast difference in the amount of the consumers' bills. Some of these went up enormously the very first quarter the meters were used; and the electricians had as much as they could do in persuading their irate customers that this result was probably due to their own carelessness and wastefulness of the light—a natural consequence of the rental system from which, as the companies were able to argue with reason, they had previously been the sufferers. Once more the stock argument of electricians, about the economy bound to ensue from the ease with which electric lamps can be turned off when not wanted, was worked for all it was worth; and the discontented consumers were pacified for the time. It has, however, been discovered that, with all possible carefulness on the part of the much-worried individuals who have to pay the lighting bills, these demands cannot be reduced to anything like their pristine proportions. The turning on and off of the switches has become a nightmare for the householder. He cannot always be running after his people to see that the fatal facility of the electrical switch is not misused to his detriment, and, especially in clubs and institutions where the new method of lighting was adopted upon the recommendation of deluded committees, the action of the companies is resented as being nearly a breach of faith.

Mr. Dobson's paper on workshop lighting, to which reference was made in our last issue, aroused some instructive discussion at the meeting of the Institution of Mechanical Engineers at which it was read. Mr. Aspinall remarked that in a modified method of arc lighting, partly direct and partly by reflection, which he has adopted at the Horwich works of the Lancashire and Yorkshire Railway Company, the lamps being 23 ft. 6 in. above the rail level, and 3 ft. 3 in. away from the reflector, the area effectively lit per lamp was about 150 square yards. Mr. E. C. de Segundo complained once more of the meaningless figures usually adopted to denote the illuminating power of arc lamps. He said he had recently tested arc lamps stated to give 1000-candle power, and had found the actual illuminating value to range between 250 and 400 candles. The diffusion of the light of electric arc lamps by reflection from the ceiling, which was the gist of Mr. Dobson's recommendation, was declared by the same speaker to involve a great sacrifice of efficiency; but Mr. A. P. Trotter remarked that he did not think engineers sufficiently appreciate the reflecting capacity of a whitewashed wall. He suggested that the reflecting power of whitewash is about 82 per cent.; and that, if kept tolerably clean, 80 per cent. of reflection may be relied upon. Professor Kennedy thinks very highly of the system of arc lighting by reflection from the ceiling. Mr. Small laid his finger upon a weak spot in all factory and institution lighting by electricity, by insisting upon the necessity of making some provision against the total extinction of light in the event of a breakdown of the generating plant. In case of a fire at a factory during the hours of lighting, this would be a dreadful calamity. Duplication of the machinery is an expensive device, and not always an effectual one. In the lighting of some jute-mills in Scotland, Mr. Small has endeavoured to meet the difficulty by introducing a subsidiary circuit controlled by an automatic switch which, in the event of an extinction of light in the main circuit, completes the circuit of a small storeage battery with the subsidiary lamps. This may do for cases of ordinary breakdowns not involving danger; but no factory owner would be held blameless in the event of fire if there were no danger-lights of gas or oil to show the way out when the electric lights failed, as they would do very soon after the outbreak.

In several English newspapers, accounts have recently appeared of the extent to which electrical appliances have entered into the conditions of life in the United States. The telephone is employed there very much more freely by people in tolerably easy circumstances than it is here, which is intelligible on the assumption that in regard to their message service, as in other respects, Americans will pay very highly to save themselves trouble, and dispense as far as possible with personal servants. A good deal is also written about the electrical tramways of the States. This system of transportation has so overrun the towns and populous parts of the country, that it is said of Philadelphia—and the same remark would probably apply with equal force to other cities—that the electric tramway companies own the city and the corporations, body and soul. It is admitted that the system in universal use is that of the "trolley wire"—the storeage battery having been abandoned as altogether impracticable; and the most fervent admirers of this way of getting about are fain to own that the addition of the trolley wires to the immense network of overhead wires "which make an average city street in America look like a long vista of gigantic spiders' webs, is not desirable." The more general verdict is that this nuisance is so great as to render it certain that the trolley-wire system of tramway working, like the running of ordinary railways along streets, will remain a peculiar feature of American towns. It is very funnily remarked by one reporter, in whose opinion everything Transatlantic ranks as "advanced" in comparison with corresponding practice in England, that besides the wires there are two other drawbacks to the "advanced American methods of street locomotion." One is the peculiar noise, resembling the sound of "a low, hissing wind moaning along the street," which is one of the lasting reminiscences of a stay in any of the large American cities. The other drawback is the danger to life from rapidly moving electric cars, which are reported to kill or maim three persons per day in Chicago, and are equally deadly elsewhere. We upon this side may, without regret, leave such "advanced" systems of locomotion to those who care to have them, or who cannot help themselves—which is closer to the point. There is an additional safeguard for keeping the American trolley-wire system of tramway working at home, in the fact that even there it is not much cheaper than horse traction.

THE CENSUS OF PERSONS ENGAGED IN GAS-WORKS.

In a third somewhat bulky volume of the Census Returns of England and Wales (1891), recently issued, which deals mainly with the occupations of the people, some interesting figures are given as to the persons employed in connection with gas-works. It appears that in all there were, at the date of the Census, no less than 30,729 persons so engaged; and, in comparing the figures with those given in 1881, we find that the numbers have increased by 12,194, which represents a substantial increase of more than 65 per cent. The total of 30,729 persons is distributed as follows: Employers, 142; employees, 29,291; working on own account, 58; others (or no statement), 1238. Turning to the table of foreigners of European birth resident in this country, we find 228 enumerated as engaged in gas-works; whereas the total in 1881 was but 67. The first-named total is distributed thus: Russians, 9; Poles, 22; Swedes, 4; Danes, 3; Dutch, 4; Norwegians, 2; Belgians, 7; Frenchmen, 5; Germans, 162 (51 in 1881); Austrians, 1; Swiss, 3; Spaniards, 1; Italians, 4; and Turks, 1.

Not the least interesting of the tables given are those which set forth the 62 towns in England and Wales, each having a population of more than 50,000 persons, in which those engaged in gas-works were resident at the time of taking the Census. Space will not permit of the towns being given at length; but the following list includes those having not less than 200 such residents:—

	Year 1891.	Year 1881.		Year 1891.	Year 1881.
London	5776	3831	Salford	369	306
West Ham	1285	346	Nottingham	353	269
Manchester	1000	581	Newcastle	279	92
Birmingham	809	439	Leicester	267	138
Leeds	804	439	Hull	246	113
Sheffield	575	381	Gateshead	228	46
Liverpool	571	426	Halifax	217	129
Bradford	496	284	Oldham	211	107
Bristol	380	285	Bolton	211	141

It will thus be observed that, in every one of the 18 towns given, a marked increase is shown in comparing the figures with those of the previous Census.

Society of Arts.—The first meeting of the 140th session of this Society will be held to-morrow week, when the opening address will be delivered by Sir R. E. Webster, Q.C., M.P., Chairman of the Council. Among the papers announced to be read after Christmas, one is on "London Coal Gas and its Enrichment," by Professor Vivian B. Lewes, F.I.C., F.C.S.; and another on "The St. Pancras Electric Light Installation," by Professor Henry Robinson. Of the five courses of Cantor Lectures to be delivered on Monday evenings during the session, one, extending from Jan. 22 to Feb. 12, 1894, will be by Professor Frank Clowes, of Nottingham, on "The Detection and Measurement of Inflammable Gas and Vapour in the Air;" and another, on April 2, 9, and 16, by Captain W. de W. Abney, C.B., F.R.S., on "Photometry."

The Salaries of Manchester Corporation Servants.—In a recent issue of the JOURNAL, reference was made to the agitation which had been set on foot against the high salaries which were said to be paid to employees of the Manchester Corporation. It may be of interest to note that not a single member of the party who made this their cry was returned at the recent election. Mr. Southern, who himself belongs to the "Advanced Liberal" party, took advantage of an opportunity afforded by an election meeting last week to describe this agitation as mere claptrap and humbug. There was, he added, one department of the Corporation where, he believed, the appointment of a man with sound scientific knowledge at £1000 a year would save the ratepayers £20,000 a year. We have been saying much the same thing for eight or ten years past; but we do not remember that in all this time Mr. Southern has taken any of the courses open to him to impress his views on other members of the Corporation.

THE FREE LABOUR CONGRESS.

One of the notable events of the past week was the holding, in the Foresters' Hall, Clerkenwell Road, of a "National Free Labour Congress," which was convened by the Free Labour Association, and was well attended by representatives of many trades, particularly such as have suffered most from the New Union agitation. The notice summoning the meeting stated that its main object would be the laying down of a national system of common action to protect the industries of the country from the mischievous operations of Socialists and New Unionist agitators. It was pointed out that "the weapons of tyranny exercised by the new-fangled Trade Unionists are not only disastrous to the best interests of Trade Unionism, but simply a criminal blunder to labour all round." The diction here supports the claim that the movement leading to the convening of this particular conference is purely spontaneous on the part of the working men who are its chief promoters. The idea of holding such a gathering is obviously a leaf taken out of the New Unionists' book; and the only doubt that occurred to us as to the success of the congress was inspired by the reflection that the position of the Free Labourers is so clear, and their charter so simple, as to render it difficult to appreciate the necessity of having a public meeting to talk about either. It must be conceded, however, that the men who were instrumental in bringing about the conference probably know well what they are about. They are, most of them, either present or ex-members of various of the newer class of Trade Unions; and, knowing how potent is the name and sense of companionship with their fellows, they probably formed their Association, and convened their congress to advertise it, in order to show that there is a way of uniting the forces of labour without entailing the manifest evils of the discredited New Union system. Moreover, they wanted to show the world that the fact of the organized Trade Unions of the country containing but a small minority of the total number of workers is susceptible of another interpretation besides that put upon it by paid officials of these Unions—namely, the stupidity and lack of public spirit of the majority. Union is strength; and union is a good thing for workers for wages, as for other orders in the community. Hitherto, however, it has been the presumption of the self-assertive leaders of the working classes that union—or rather Unionism, which is a different thing—cannot be had without professional agitators, strikes, street processions, banners, mass meetings, and all sorts of incidental paraphernalia, the payments for which must pass through their hands. Under the direction of these demagogues, too often ignorant and hare-brained where they are not venal, the association of working men with the ostensible object of legitimately improving their position has been confused and confounded with all manner of political, social, and economic crazes and fads; and the central idea of union—most important of all—has consequently been entirely lost in the bewildering superfluities of Unionism.

Whatever else the New Unionists thus encumbered themselves withal, the most conspicuous of their principles, and that which has done them greater injury than all the rest put together, is the demand for the so-called "recognition of Unionism," which means restriction to society members of the right to labour. This is what the New Unionists have chiefly fought for, at home and abroad; and it is upon this ground they have always and everywhere been beaten. To put the matter fairly, it should be remarked that this principle was no invention of the New Unionists; and it was not to it that they owe their distinctive appellation. The same game was played for a while by the old Trade Unions, and in the notorious Broadhead the Sheffield saw-grinders of the last generation had a leader as determined and more desperate in attempting to secure the monopoly of employment for society men than the later movement has been able to show. In point of fact, therefore, the only difference between the "Old" and the "New" Unionism in this regard is that until lately the former had learnt the lesson that the liberty of the subject must be respected, while the latter had it to learn. Now the two divisions of Unionism are equal in this respect; and the chief remaining difference between them consists in the comparative cheapness and worthlessness of the newer societies, which, having been founded as fighting bodies, pure and simple, have no reason for continued existence after their "teeth" have been "drawn." At best the Dockers, the Gas Workers, and other similar bodies, are now so many dismantled hulks, in which a few caretakers drag out a torpid existence while they rot at their moorings.

In all probability, many of those men who, having revolted against the New Unionism and its leaders, are now exhibiting themselves as representatives of the Free Labour Movement, owe their changed views simply to the failure of the former to carry out the full programme. Their alteration of position is perfectly intelligible, and is defensible upon the low ground of expediency. They were good Unionists, while Unionism as Mann, Tillett, and Co., understand it, appeared to be carrying all before it; and now, when its spasmodic, ill-directed force is seen to be spent, they are as ready to make a fresh start as are their old leaders, every one of whom is suspected of being on the look-out for a "soft job." This is the way of the world, of which it would be idle to complain. Not all Free Labourers are of this time-serving character, however. There must be many who have "never bowed the knee to Baal" in the shape of a mass-meeting orator; who have kept their liberty as a sacred possession, not perhaps fully knowing why, but through a dim consciousness that this is the right and profitable conduct for a free man. These men are the salt of their order; and they are worth all the encouragement that the Free Labour Association has to offer them.

For it seems to be as necessary now as at any earlier stage of the struggle of humanity with its surroundings, to insist upon the supreme importance to all men that every individual man shall be free to do and to say the thing he will, subject only to the laws of God and his country. Eternal vigilance, as the old saw goes, is the price of this liberty, which is perpetually being assailed by great men and by small, according as one or the other happens to be uppermost, and in the name of this or that pretended necessity. In Burne Jones's picture of "Fortune's Wheel," the beggar has his foot on the head of the king; and so it is in the world, for such as have eyes to see. Now it is the crowned tyrant who seeks to mould the universal endeavour in the way he thinks best; and now it is the mountebank who essays the same task from the elevation of a mass-meeting platform. Men are only too often the dupes of words; and the majority follow one another like sheep. The invincible charlatan is backed up by the vaunted Press; and few there are with insight and courage enough to declare that freedom is more precious than advantage.

The whole tendency of Trade Unionism, judged in this light, is retrograde. Hear the self-styled Progressist clamouring for men to be muzzled here, reined in there, debarred from going yonder, simply because his judgment, the possible fallibility of which he never suspects, assures him it will be good for them! He has forgotten, if he ever knew, that this was the very plea that lit the fires of Smithfield, and still supplies Siberia with immigrants. You shall take in hand fifty "popular," "advanced" newspapers published in England every day, and find in them demagogues and chance majorities of voters supported in claims that do not differ in principle one jot from the most arrogant pretensions of king or kaiser. When Trade Unionists begin to evince a glimmering of a perception that the cause which put J. H. Wilson in gaol at Cardiff is in all respects the same as that which crushed the Spanish Armada and in later years led to the independence of the United States, the need for such organizations as the Free Labour Association will no longer exist.

There was much to interest in the recent congress, the proceedings at which were officially brought under the notice of the Prime Minister and the Lord Mayor. It was presided over by Mr. J. Chandler, who described himself as having been a prominent Trade Unionist; and he certainly preserved the knack of plain-speaking to which Union leaders have accustomed their hearers when the subject has been the character and acts of employers of labour. This time, however, the subject-matter was changed, although the old vehemence of declamation remained. Mr. Chandler stated the principles of the Free Labour Association as comprising "a fair day's labour for a fair day's pay; freedom of action to sell their labour in the best possible market, and to obtain the best available conditions from their employers, in the interest of themselves and families; to limit, and if possible to do away with strikes altogether; and, above all, to protect and defend the members of the Association against the tyranny, despotism, and outrage of the New Unions and their arrogant and conceited leaders." Another speaker, Mr. T. M. Kelly, whose name we seem to remember as a prominent Trade Unionist, and who claimed to have been one of the founders of the Trade Union Congress, moved a resolution condemnatory of the "recent senseless and abortive strikes;" in the course of his speech saying many pointed and unpleasant things of some of the professional strike leaders. Among other matters, he averred that the single victory upon which the New Unionists have lived during the last four years—the securing of the docker's "tanner"—was assured beforehand by arrangement with the employers; and that here, as with the gas stokers' eight-hour shift, the demagogues' triumph was no more than the forcing of an open door.

One of the most important of the resolutions considered and passed by the congress was moved by Mr. Ellis—a London and North-Western Railway Company's servant. It was directed against the compulsory provisions of the Employers' Liability Bill. It claimed, as a matter of equity, "the right for all workmen to make a fair and mutual arrangement with their employers, so as to secure equitable compensation for themselves and those depending upon them in the unfortunate case of accident and death." Several other resolutions were discussed and passed by the congress; and the practical, pointed character and terms of these motions were in surprising contrast to the sentimental, visionary resolutions which the Trade Union Congress amuses itself by passing in such profusion as to make this assembly the laughing-stock of disinterested critics. Altogether, the first congress of the Free Labour Association must be pronounced a great success on all grounds; and if the Executive of the Association only preserve the firm ground of principle upon which their organization is based, and continue to conduct their business as sensibly as they managed their meeting they held last week, the Association will most assuredly have a great future before it.

THE CHARGE FOR WATER FOR BATHS.

THE newspaper reporter, particularly if he be engaged upon the staff of a halfpenny paper, must necessarily be glad at heart when he is able to light upon a suggested grievance of the kind referred to in a recent issue of the *Morning*. The water question coupled with what is described as the "strange action" of the Lambeth Water Company and "illegal charging for baths and gardens," necessarily furnishes a journalist of this class with just the sort of material that he delights to manipulate. For some time past there has been a difference of opinion between the Company on the one hand and the Camberwell Vestry on the other. Being in doubt as to their legal rights, the Vestry had recourse to the counsel and advice of the redoubtable Mr. Archibald E. Dobbs; and that gentleman has favoured the Vestry with an oracular opinion which, whatever its legal value, must necessarily have considerable effect in straining the relations between the Company and the water consumers within their district.

The section of the Lambeth Water-Works Act, 1848, which has given rise to controversy, provides that a supply of water for domestic purposes shall not include a supply for water for "baths, horses, cattle, or for washing carriages, or for any trade or business whatsoever." When called upon to construe this phraseology, Mr. Dobbs starts by declaring that the dominant words which convey the real meaning of the section are "for any trade or business," and that the domestic bath, or bathing utensil, does not come within the operation of the section. That is the first head of the learned gentleman's opinion. But he proceeds to qualify it, in an extremely significant manner, by pointing out that, even if the section bears the construction that the Company have hitherto placed upon it, or, in other words, if he (Mr. Dobbs) is wrong, the success of the Company in establishing their position "would rouse against the Act the common sense of the nation and the spirit of all our recent sanitary legislation," so that the Act, in that case, would have to be amended. There is, doubtless, a fine flavour about the reference to the "common sense of the nation;" but, practically interpreted, Mr. Dobbs's opinion seems to mean that, if the Company insist upon their rights, there will be all the materials for angry agitation within reach of the Camberwell Vestry. In these circumstances, Mr. Dobbs advises the water consumers to refuse to pay the extra charge for baths. As to the morality of this advice we say nothing; but it is worth while to clear the ground to some extent by noting what the decisions in regard to extra charges for domestic baths really involve.

In 1883, in the case of *The Sheffield Water-Works Company v. Bingham*, it was shown that there was no express provision in the principal or special Acts as to how water supplied to fixed baths in private houses is to be measured, or whether the Company or consumer must bear the cost of providing a meter or measuring the water. But by section 14 of the Water-Works Clauses Act, 1863, it is enacted that, where a company supply water by measure, they may let to the consumer a meter for such remuneration in money as may be agreed upon. The case was argued before the late Mr. Justice Pearson, who ruled that a consumer taking water from the Company for a fixed bath in his private house was bound, at his own expense, to measure the water so used by some automatic or self-measuring meter or other instrument, or in some other equally accurate way to record the quantity of water from time to time taken. Later on in the same year, however, came the case of *Weaver v. The Corporation of Cardiff*,* which also had reference to the supply of water for baths in private houses. According to the Cardiff Act, a supply of water for domestic purposes was not to include "a supply for baths, washhouses, or public purposes, &c." The plaintiff having erected in his house a fixed bath connected with the water-service, the Corporation required the payment of a charge in addition to the ordinary water-rate; and, on this being disputed. the matter came before Lord (then Mr. Justice) Field, who decided against the Corporation. In doing so, his Lordship was careful to point out that he was obliged to construe this particular Act of Parliament alone, as assistance could not be obtained from other statutes in putting a construction on an Act which applied to Cardiff in particular. It appeared to him that the word "baths" must, with reference to the context, be taken to mean a public establishment of baths or washhouses, and that the "public purposes" should read as meaning "*other* public purposes." It has been considered by many competent critics that this was a somewhat forced and artificial construction of the Act; but, for present purposes, the importance of the case lies in the emphatic ruling of the learned Judge that the case must be decided on the terms of the Local Act alone, which were distinguishable, in his Lordship's opinion, from those found in the Act on which the Sheffield case had turned.

When carefully examined, there is very little in the decision in the Cardiff case which strengthens the legal position of the Camberwell Vestry, or which seems to warrant the first part of Mr. Dobbs's opinion. The juxtaposition of the word "baths" in the Lambeth Act is not the same as it is in the Cardiff Act. It is by no means clear or certain that the Lambeth Act, providing that a supply for domestic purposes shall not include a supply for baths, horses, cattle, &c., can be narrowed down to mean baths other than those in common use in private houses. It is a question of construction, turning upon the phraseology of this Act alone, on which, doubtless much legal ingenuity and forensic skill might be expended. Obviously, in citing the Cardiff case, Mr. Dobbs is calling in aid an authority which is no authority for the proposition he lays down, and which can merely have the effect of confusing the Lambeth case in the eyes of those who have not the means of ascertaining what the previous decision really was. The suggestion seems to be made that the Lambeth Water Company have deliberately enforced—or, rather, that they have pocketed—an illegal charge. But it is not difficult to understand that the Company may have acted in complete good faith, and that if they have hitherto refrained from taking any legal action to establish their right to the extra rate for a supply to baths, they have been influenced by considerations of policy, and a desire to live on peaceable terms, if possible, with the thousands of consumers whose wants in the matter of water supply they have to meet.

* The cases cited were reported in the JOURNAL, Vol. XLI., pp. 642, 777.

NOTES.

A Colour-Tint Photometer.

Mr. Alfred M. Mayer has described in the *American Journal of Science* a photometer which he has devised for measuring the intensities of lights of different colours. The instrument is constructed in such a manner that the two tints to be observed are reduced to the same by the effects of contrast. Two discs of thin Bristol board, 13 centimetres in diameter, have half of their surface removed in the shape of eight equidistant sectors. Between them is placed a circle of white tracing-paper, and the discs are then clamped together with their spaces coincident. The compound disc is mounted on a rotator and placed opposite two silvered mirrors inclined at an angle of 150°. The plane of the disc bisects the angle formed by the mirrors, so that an observer standing in front of the arrangement can see both sides of it at the same time. If now the disc is rotated while illuminated by daylight on the one side and by lamplight on the other, the side illuminated by daylight appears white tinted with yellow, and the other side appears white tinted with blue. A compound disc of red lead, of chrome yellow, and of white cardboard was placed by Mr. Mayer on the daylight side, and an ultramarine, emerald green, and white disc on the lamp-light side. The greenish blue produced by the latter combination made the light blue on the lamp-light side appear faintly orange yellow by contrast; while on the other side of the ring, the orange yellow disc had diminished the orange yellow tint of the ring to the same feeble orange yellow as seen on the other side. Mr. Mayer calls this a study of the phenomena of simultaneous contrast colour; but how the arrangement acts as a photometer does not appear at all clearly from his description of the effects.

The Formation of Carbonic Oxide and Carbonic Acid.

A quotation from an inaugural address pronounced by Herr R. Ernst before the University of Giessen on the subject of the principles of combustion was lately published in the *Engineer*, from which we take the following abstract. It is a matter of common knowledge that carbon, the chief constituent of most fuel, forms two oxides when burnt in air—one being the incombustible carbonic acid, and the other the combustible carbonic oxide. These two oxides are commonly produced together; the proportion of each depending upon the conditions under which combustion takes place. The nature of these conditions has hitherto been doubtful. The usual text-book explanation of the matter is that carbonic oxide is formed when there is a deficiency of air, and carbonic acid when the air is in excess. What actually occurs is much less simple. In the first place, oxidation begins at a comparatively low temperature—at about 400° C.—when carbonic acid is formed as the main product, whether the air is in large or small quantity. Only a slight proportion of carbonic oxide is simultaneously produced. The rate of combustion increases as the temperature rises to 700°C.; but the chief product of combustion is still carbonic acid, even though the air is so far from being in excess as to make it possible for the effluent gases to contain 20 per cent. by volume of carbonic acid, which is almost the theoretical maximum, thereby proving the consumption of the whole of the oxygen. Above the temperature of 700° C., the proportion of carbonic oxide to carbonic acid rapidly rises, until at 995° C., the former gas is exclusively produced. Mere length of carbon column is not sufficient to induce the formation of carbonic oxide; a minimum temperature has first to be attained. These observations go to explain why a dull coke fire burns without flame, and why, when the temperature rises, the characteristic flame of carbonic oxide is always seen. They also confirm the principle of working gas generators as hot as possible, to get out of them the best result in carbonic oxide.

The Estimation of Nitrogen in Gas.

The estimation of nitrogen in illuminating gas forms the subject of an article by Dr. L. Lang in a recent number of the *Journal für Gasbeleuchtung*. The customary method of reckoning nitrogen as the residue left after the estimation of the remaining constituents, is unsatisfactory for two reasons: (1) The accumulated errors of all the previous determinations are

embraced in the nitrogen determination, and render it very inexact; and (2) it requires considerable time for its execution. The author considers the method devised by Mr. C. H. New (see JOURNAL, Vol. LX., p. 73), though quite practical, involves a greater expenditure on apparatus than can be afforded for the purposes of technical gas analysis; and he proposes to substitute the following method of his own: A suitable quantity of the gas to be examined is measured off in a Bunte burette; about 20 c.c. being convenient for most gases. It is mixed with 125 c.c. of air and exploded in a Hempel explosion pipette. The carbonic acid and oxygen are completely absorbed; and the volume of nitrogen remaining is read. The excess of this volume over that of the known volume of nitrogen in the added quantity of air, gives the amount of nitrogen in the volume of gas operated upon. This can then be calculated into the volume of nitrogen in 100 volumes of the gas. The determination requires only ordinary gas analysis apparatus; and it can be completed in a quarter of an hour. The applicability of the method to technical gas analysis is indicated by several analyses recorded by its deviser.

Steam-Turbines.

Much attention is being directed to the class of motors known as steam-turbines, which, having for long been discredited as wasteful power generators, are now being slowly admitted into good engineering society as respectable machines. The best-known representative of these engines in England is the Parsons steam-turbine, which is being used at the Cambridge electric lighting station; but another well-reputed pattern is that of Dr. de Laval, of Stockholm, who has succeeded, after a long and costly series of experiments, in producing an exceedingly simple motor. Several of these have been working without a hitch throughout the whole period of the Chicago Exhibition. One of the great advantages which the steam-turbine has over the reciprocating steam-engine consists in its working being independent of the cooling influences which are so inimical to the economical performance of the latter type of machine; but hitherto the superior efficiency of cylinder engines in utilizing the expansive quality of steam has rendered them more economical in use. The fact that the steam-turbine works hot has suggested the possibility of the much-needed hot gas-engine being found in the same type of motor; but it will not be by any means an easy task to overcome the mechanical difficulties that stand in the way of the successful production of a gas-turbine. In the Laval steam-turbine, the principle of the working parts is exactly the same as that of the axial water-turbine; the arrangement being that the steam has acquired the same pressure as the surrounding atmosphere before reaching the turbine wheel—thus converting its capacity for work into momentum. The steam is discharged upon the motor-wheel through an expanding nozzle, in passing through which it acquires a velocity proportional to the amount of expansion. Starting with a pressure of 75 lbs., and expanding down to an absolute pressure of one atmosphere, the steam attains a velocity of 2625 feet per second. This enormous velocity could not be transmitted to the periphery of the bucket-wheel; and, as a matter of fact, the velocity of the latter is in a 5-horse power steam-turbine 574 feet per second, and the number of revolutions 30,000 per minute. In a gearing-box this speed is reduced to 3000 revolutions per minute; and this is the speed of the pulley from which the power is taken off. The efficiency of the Laval turbine is about equal to that of triple-expansion steam-engines of corresponding size.

Messrs. S. Pontifex and Co.—Mr. F. Lennard, who for the past 25 years has been Manager to Messrs. S. Pontifex and Co., Gas, Water, and Electrical Engineers, of 22, Coleman Street, E.C., has now acquired the entire business; but we are informed that he intends to retain the present title.

Death of a Director of the Croydon Gas Company.—At the close of the business at the Croydon Borough Police Court last Tuesday, the Chief Clerk (Mr. H. Seale) said he regretted to have to report to the Magistrates the death of one of their colleagues, in the person of Mr. Henry Chasemore, a partner in the banking firm of Messrs. Chasemore and Robinson, whose business was lately merged in that of the Union Bank of London. Deceased was one of the original Borough Magistrates, a Commissioner of Taxes, Treasurer to the Croydon Union and the Croydon School Board, and until quite lately Treasurer to the Corporation. He was also a Director of the Croydon Gas Company.

The Slope of Sewers.—Mr. Rudolph Henry, M.Inst.C.E., an American authority on sanitary engineering, says the least slope for sewers should be such as will cause a velocity sufficient to prevent the accumulation of deposits when the sewer runs at least half full. A 6-inch pipe should have a hydraulic slope of at least 0·7 per cent.; an 8-inch, 0·4 per cent.; a 10-inch, 0·3 per cent.; a 12-inch, 0·2 per cent.; a 15-inch, 0·15 per cent.; and an 18-inch, 0·12 per cent.—in other words, a slope which will give a velocity of about 2 feet a minute when running half full. In vitrified pipe sewers, the velocity may be as great as from 8 to 10 feet per second, if but little sand or gravel can enter them. In determining the grade of sewers, a careful distinction is to be drawn between the hydraulic slope and that of the sewer bottom, as even on light slopes the latter can generally be greater than the former.

TECHNICAL RECORD.

THE BIRMINGHAM GAS UNDERTAKING.

As briefly mentioned in the JOURNAL last week, the above subject was made the basis of the Inaugural Address delivered by Mr. CHARLES HUNT, M.Inst.C.E., Engineer of the Windsor St. Gas-Works of the Birmingham Corporation, at the opening meeting for the present session of the Association of Birmingham Students of the Institution of Civil Engineers. We now, as promised, give a few extracts from the address.

Mr. Hunt commenced his address with some remarks upon the past work of the Association, and referred to the great value, as object-lessons, of the visits which the members had been able to pay to works in the neighbourhood of Birmingham. He acknowledged the indebtedness of the Association to gentlemen who had afforded these facilities for acquiring knowledge, and also to Mr. J. Mansergh, M.Inst.C.E., for the graphic description he had given of the great water scheme on which he is engaged on behalf of the city. With regard to the future, Mr. Hunt thought it presented a promising prospect; and he urged each member individually to do his part, however trifling it might be, to ensure the success of the meetings. He then proceeded as follows:—

In seeking to comply with the request of your Secretary that I should occupy a small portion of your time to-night in speaking upon some engineering subject, I am met with the difficulty that the branch of the profession to which I have the honour to belong is not a very attractive one, nor, it must be confessed, is it altogether popular. For example, our very excellent friend the Chief of the Water Department will not allow our gas-mains to come within 7 feet of his mains, if he can help it, although I have never heard of any serious consequences resulting from a close acquaintance; while, worse still, as some may think, we have never been permitted even so close an approach as this to the Council-table of the Institution in Great George Street. This apparent lack of appreciation has not, however, prevented us from being of some use in our day and generation, not only in the diffusion of light over some of the dark places of the earth, but also in the lessons that gas engineering has taught in the use and application of fuel; while it can point with pardonable pride to vast industries established and maintained by its aid. Moreover, the construction now-a-days of a large gas-works involves problems that sometimes usefully engage the attention of practitioners in the highest branches of engineering. The time may—and, in the opinion of some of our electrical friends, it will—never come when gas schemes rivalling in magnitude our great water scheme will become necessary for the supply of large centres of population; although something akin to this has been more than once mooted, in the shape of huge gas-works at the collieries, sending forth the finished product in all directions through many miles of conduits. Within, however, the more moderate dimensions of existing systems of supply, there is field enough for energy and science, not to sustain a moribund industry, but in contriving how best to keep pace with a constantly increasing demand. The reality of this may be gauged by what has been experienced in Birmingham since the transfer of the gas undertakings to the Corporation in 1875; the annual consumption of coal having risen since that date from 296,000 to 465,000 tons, or 57·7 per cent., nothwithstanding a reduction in the area of supply owing to the establishment of separate gas-works by neighbouring Local Authorities. What this represents in extension of works and mains may be easily imagined; and that which has taken place here is but a reflection of the general tendency of gas consumption. The total consumption of coal for gas-making purposes within the United Kingdom has nearly doubled during the same period, amounting at the present time to about 11 million tons per annum. In Birmingham the task has been rendered more onerous by the necessity for making good the deficiencies of plant which existed in the time of the Companies, in addition to which, and providing for the annual increase, future requirements have, within prudent limits, been anticipated.

In spite of the growth of competition with the electric light on the one hand and oil on the other, the advantages of a cheap supply of illuminating gas were never more apparent than at the present time. It was a favourite idea of the late Sir William Siemens that heating as well as lighting gas might be supplied from the gas-works by separating the rich from the poor gas as evolved in the process of distillation; the richer gas, containing the principal portion of the illuminating hydrocarbons, being given off during the earlier part of the charge—the later portion consisting largely of carbonic oxide or hydrogen, and being but feebly luminous. The fallacy of this proposition lay in the practical impossibility of imparting to the separated gases a greater value than they possess in combination. Thus the richer gas would not command a higher price than would be proportionate to its illuminating power; while the poorer gas would also have to be charged for accordingly, with the added disadvantage that the former would be too rich for economical combustion in the ordinary way, and the poorer gas might—and doubtless would, for many purposes—prove too poor for heating. At the time this proposal was mooted, a

series of experiments were made under my direction, which showed very clearly that the cousumption of gas in a gas-engine varies, for the same amount of duty performed, very much in direct proportion to its illuminating power. The engine employed was a 12-horse power nominal "Otto" Crossley; and the table, taken from the Proceedings of The Gas Institute for 1882 (p. 205) shows the results obtained:—

Illuminating Power of Gas. Candles.	Consumption per Indicated Horse Power per Hour. Cubic Feet.	Value for Motive Power.	Value for Lighting.
11·96	30·31	1·000	1·000
15·00	24·41	1·241	1·254
17·20	22·70	1·335	1·438
22·85	17·73	1·709	1·910
26·00	16·26	1·864	2·173
29·14	15·00	2·020	2·436

It is clear from such results that there could be no possible gain from the introduction of a double service for the separate supply of a heating gas derived as proposed; although it would appear that a general reduction of illuminating power to 15 or even to 12 candles might be attended with economy—such gas being shown to be of absolutely equal value for both lighting and motive power. Any appreciable reduction, however, of candle power would, for gas-engines, mean a loss of efficiency, for which a proportionate reduction of price would be insufficient compensation; and to show how important this source of consumption has already become, it may be mentioned that there are at the present time something like 1700 engines worked by gas in Birmingham and the immediate vicinity—representing probably an annual consumption of from 300 to 400 million cubic feet. This is a good indication of the field that is open for the employment of heating gas—a field which is held at present, and seems likely to continue to be held, by lighting gas as ordinarily supplied, which thus economically, because involving but one service, fulfils a double purpose. It may, indeed, be almost inferred that ordinary lighting gas is capable of satisfying all the requirements of a heating gas; price alone standing in the way of its more extended use in this direction. The extent to which a really cheap and at the same time good heating gas may be expected to find consumption is well illustrated by what has taken place during the last few years in the natural gas regions of the United States. There smoke has been banished from districts literally given up to manufactures—the City of Pittsburgh in particular having been transformed into almost a picture of cleanliness; and the curtailment of the supply of natural gas, in consequence of the partial failure of the wells, is rightly regarded as a public misfortune. When I was in Pittsburgh three years ago, the consumption of this product was estimated as equivalent to about 5 million tons of coal annually, In addition to being largely used for manufacturing purposes, raising steam, &c., it had practically banished coal from the household. At the hotel where I stayed, no solid fuel had been used for a considerable time; all the cooking and heating being done by gas.

According to reliable analyses, the calorific value of natural gas is represented by 874 British thermal units, as compared with 636 units in the case of a sample of ordinary lighting gas, and 293 in that of water gas; its higher value being accounted for by the presence of a very large proportion of marsh gas, and a comparatively small percentage of hydrogen, with almost an entire absence of carbonic oxide.

It is only to be expected that gas makers should strive by every means in their power to bring down the cost of gas to the lowest possible figure, conscious that almost every penny of reduction they are able to effect widens the field of their operations. In so doing, they do not lose sight of the fact that the demand for an increasingly high standard of illuminating power may be inconsistent with real economy, and ought, in the interests of the consumers themselves, to be resisted. To require a higher candle power than the ordinary coal of a district is fairly capable of producing, involves the employment of expensive enriching material, which is the less necessary because the loss which is almost habitually incurred through the use of unsuitable burners is fairly enough represented by the difference between what are usually denominated high and low qualities of common gas. In other words, by employing proper burners, gas of (say) 15-candle power will be found perfectly well adapted for all ordinary purposes of illumination, while the cost of producing such gas is proportionately less than that of gas having a higher candle power.

Moreover, the latest development in burners affords a really startling indication of possibilities in this direction. Most of those present are doubtless familiar with what is called the "incandescent" gas-burner, which is displayed in more than one shop-window not far from this room, and which many, attracted by its brilliancy, have paid the compliment of mistaking for the electric light. It is indeed so far similar to its rival in that it also proceeds from the action of heat; the heat afforded by the combustion of the gas in a Bunsen burner being relied upon in place of the luminosity derivable from the combustion itself. Instead, therefore, of carefully checking and regulating the supply of air, as in the latter case, to the requirements of luminous combustion, a non-luminous flame is produced; and this is impinged upon a cage or mantle made of a mixture of extremely infusible metallic earths, such as zirconia, which it raises to incandescence—in this respect resembling somewhat closely the oxy-hydrogen or lime light. A recent test of one of these burners gave, with a consumption of 3·5 cubic feet per hour of gas testing 17 candles when consumed in a standard Argand burner at the rate of 5 cubic feet per hour, an illuminating power of 46 candles; and with a consumption of 3 cubic feet, 38 candles—13·14 and 12·66 candles per foot respectively. This is nearly four times the light yielded by the standard burner, and not far off five times that afforded by the ordinary flat-flame burners in common use. In the face of so remarkable an economical effect, all ordinary methods, both of the estimation and the consumption of gas, appear to be wasteful and extravagant.

Mr. Hunt next briefly described the process of manufacturing illuminating gas, and then proceeded to give his audience some idea of the extent of the undertaking with which he is associated. His remarks on this subject were as follows:—

As already stated, the quantity of coal annually required for gas-making amounts to about 465,000 tons. This is distributed between four different works—viz., Saltley, Windsor Street, Adderley Street (Bordesley), and Swan Village (West Bromwich); the two first named being the principal. The total area of the four works approaches to 60 acres, exclusive of unoccupied ground; and their total productive capacity is fully 25 million cubic feet per diem, with gasholders capable of storing about 30 million cubic feet. The greatest output in any one day (24 hours) has been 24,076,000 cubic feet; and the total output during the year ending March 31, 1893, was 4338 million cubic feet. Twelve trunk mains, varying from 48 inches in diameter downwards, lead from the various works, and spread out into a system of distributing mains, the total length of which is about 550 miles. The extreme distance to which gas is conveyed from any works is about 10 miles.

In addition to the receipts for gas, the Gas Department necessarily derives considerable revenue from the sale of the residual products, consisting chiefly of coke, tar, and ammoniacal liquor, the market prices of which materially affect the prosperity of the undertaking. The following are the quantities of these residuals disposed of during the year ended March 31 last, according to Field's "Analysis"—

Coke and breeze	226,776	tons.
Tar	4,921,359	gallons
Ammoniacal liquor	14,519,255	„ of 10 oz.

It may be added that the total number of men employed during the winter months is about 4500.

In point of size, the Birmingham undertaking stands third on the list of gas undertakings within the United Kingdom; the two largest being those of The Gaslight and Coke Company and the South Metropolitan Company of London. In number of consumers, however, which is 56,249, it stands but eighth on the list; being exceeded in this respect not only by the two Companies just mentioned, but also by Manchester, Liverpool, Glasgow, Leeds, and Edinburgh.

The Windsor Street works, which were commenced in 1847, originally occupied an area of 7 acres, which was afterwards increased to about 9 acres; and eventually, following upon the transfer of the undertakings to the Corporation, to 26 acres. Formerly the coal used was brought by canal from South Staffordshire; but the gradual exhaustion of the coal seams in this district compelled the Company to go farther afield. In course of time, therefore, the whole of it had to be procured by rail, and carted to the works. The cost of cartage was a principal reason for desiring to transfer the manufacture to the site adjoining the Midland Railway at Nechells, the purchase of which was advised by me, and supported by the late Mr. Thomas Hawksley, M.Inst.C.E., and was taken up by the Corporation when they became owners of the gas-works. Now the works are in direct communication with the London and North-Western Railway, which gives access to all the most important coal-fields of the Midlands. The works are, for the most part, new; having been commenced about the year 1880. The only portions remaining of the old works are the retort-houses (two of which have been dismantled), a condenser, and a few small gasholders.

Mr. Hunt then described in detail the plant and general arrangements at the Windsor Street works; illustrating his remarks by the aid of diagrams. Having already given in the JOURNAL full particulars of these works, this portion of the address is not reproduced; but an opportunity may be taken later on of calling attention to the labour-saving and other appliances which have been introduced there.

The concluding part of the address was devoted to the storage plant; Mr. Hunt's remarks being as follows:—

Time will not permit of more than a very brief mention of the large gasholders which put the finishing touch to the work of which I have given a most imperfect description. They are what may be called twin holders; their tanks being separated by a single wall 7 feet in thickness, at which junction there is a standard common to the two holders. In the course of a paper which I had the honour to read to this Association a few years ago, mention was made of some of the difficulties which were encountered in the construction of these tanks, which are each 240 feet in diameter by 51 feet deep, owing to the unsatisfactory nature of the soil; and twice, since they were completed, portions of the earth backing have had to be excavated to a considerable depth, and replaced with lime concrete, so as to

support the walls against a shifting soil. Everything now, however, has for some time appeared to be perfectly solid; no further movement having been observed.

The gasholders rise in three lifts to a height of 150 feet, in addition to which the crowns have a rise in the centre of 20 feet; making about 170 feet total height. The diameters of the different lifts are 236 feet, 233 feet, and 230 feet respectively; the capacity of each holder being about 6½ million cubic feet. The standards of the outer framing are formed of two columns, constructed of pile channel-iron; the outer column raking forward to the gasholder, and the two columns being secured together at top and bottom, and at intervals up the entire length of the standard, with wrought-iron ties and cast-iron struts. The gasholders are what is termed untrussed—that is to say, in place of the crown being supported by a trussed roof when the gasholder is out of action, it rests upon a stationary wooden framing built up from the floor of the tank; and the tendency of all such structures to assume a spherical shape is resisted by a strong curb formed of steel angles and plates. About 3300 tons of metal were used in the construction of these holders.

The progress made in gasholder construction within the space of much less than two generations is well exemplified by the successive additions made to these works since they were commenced in 1847. The first four holders erected had a capacity of about 200,000 cubic feet each; the next six, 300,000 to 350,000 cubic feet, or about half as large again. Then there was a considerable step forward in the shape of one to contain about 700,000 cubic feet, or double the size of the preceding ones. The first holder constructed by myself at once trebled this, with a capacity of 2,100,000 cubic feet, which is also the size of the one at Nechells, constructed from my designs, and now attached to the Saltley works. This again has been trebled by the 6,500,000 cubic feet holders. These, although the largest in existence at the time they were erected, have since been several times eclipsed; and notably so by the one recently erected by the South Metropolitan Gas Company, which has a capacity of 12,000,000 cubic feet, or 60 times the size at which we started. An eminent Engineer, now gone to his rest, once visited the Windsor Street works at the time we were constructing the tank for the 2,100,000 cubic feet holder. His remark upon it was: "Too many eggs in one basket." To which, turning to the nest of small holders, of the inconvenience of which I had had painful experience, I rejoined: "Surely it is rather a case of too many baskets for the eggs." In this, as in other things of the kind, there can be no such word as "finality." Compared with other branches of engineering, the sphere of the gas engineer may be a modest one; yet he can know no bounds but those which are set by the requirements of his time. In all the material concerns of life, small as well as great, there can be no rest for the creative faculty, no pause in the subjugation of matter to the will and the service of man.

Issue of Debenture Stock of the East London Water-Works Company.—By an announcement which appears elsewhere, our readers will see that the East London Water Company are inviting tenders for the final portion (£35,000) of their new perpetual 4½ per cent. debenture stock, applications for which must be sent in not later than the morning of the 14th prox.

A New Gas-Measuring Standard.—The Standards Department of the Board of Trade notify that, under the provisions of the Sale of Gas Act, 1859, a new model gasholder, of the capacity of 20 cubic feet, has been provided by the Board, and has been approved as a gas-measuring standard. The Department are therefore now prepared to accept for verification copies of the new 20-feet standard holder.

The "Daily Chronicle" and the South Metropolitan Workmen.—Mr. George Livesey has issued a circular dealing with the above matter, which was commented upon in our editorial columns last week. He naturally asks, as we did, why the Editor of the *Chronicle*, if he did not believe the report could be true, that the Directors of the South Metropolitan Company were coercing their men to petition in favour of the "contracting out" clause of the Employers' Liability Bill, printed it without first making inquiry. He says the *Star* and the *Morning* heard something about it, and they honourably and fairly sent representatives to the Company's office to ascertain the truth before putting any report in their respective papers; and another paper made a similar inquiry of the workmen at Vauxhall. They all found the *Chronicle's* statement was untrue, and reported accordingly. Mr. Livesey says: "If I answered or attempted to correct all such reports, I should find myself tolerably well occupied. I therefore followed my usual plan, and took no notice of it." It appears, however, that three letters were sent to the *Chronicle*—one by the profit-sharing representative of the Rotherhithe works, and the others by members of the Profit-sharing Committee at the Old Kent Road and Vauxhall stations—contradicting the statement; but though all these letters bore the names of the writers, they were not inserted. Mr. Livesey adds: "It is not necessary for me to say that neither the Directors nor I attempt to coerce or threaten the men; but I feel it right to make this simple statement of facts, on which I will pass no opinion—preferring to leave the workmen to form their own opinion of the conduct of the *Daily Chronicle*, and of the truth of their statement."

THE DEVELOPMENT AND TRANSMISSION OF POWER FROM CENTRAL STATIONS.

Continuing our abstract of the lectures on the above subject delivered by Professor UNWIN before the Society of Arts (see *ante*, pp. 762, 803), we have now to deal with the fourth of the series, which was devoted to hydraulic transmission.

The lecturer began by giving to Lord Armstrong the credit of the first practical application of a system of distribution of pressure water for purposes of motive power. In an article which appeared in the *Mechanics' Magazine* as far back as 1840, Lord Armstrong pointed out that, when water is lifted by a pumping-engine, it becomes the recipient of the energy expended in raising it. If the same water is used to actuate motors, it renders back the power conferred in its descent to its original level, and thus becomes a medium through which the power of the pumping-engine may be transmitted to a distance, and distributed in large or small quantities as required. Lord Armstrong showed that a continuously working steam-pumping-engine, of comparatively small size, was capable of doing a large amount of distributed intermittent work; and he argued that this would be more economical than the employment of a number of steam motors to drive each separate machine. Soon after this he invented a hydraulic crane, of a type which has been used ever since. In 1845 a crane worked by pressure water from the town mains was erected in Newcastle; and, in 1848, similar cranes were used by the North-Eastern Railway at their goods station in that city. In 1851 hydraulic transmission was adopted for driving cranes and working dock gates at Great Grimsby, at New Holland, on the Humber, and by Brunel on the Great Western Railway.

Professor Unwin proceeded to group systems of hydraulic transmission into two classes—high and low pressure systems; the characteristic feature of the former being accumulator storeage, and of the latter reservoir storeage. He described the high-pressure systems in operation at Hull, and in London, Liverpool, Birmingham, and Manchester. The Hull scheme was the first for distributing power hydraulically to many consumers. The principal main is 6 inches in diameter and some 1485 yards in length. The pumping-station is arranged for four 60-horse power engines, of which two have been erected. Each engine delivers 130 gallons per minute at a pressure of 700 lbs. per square inch, corresponding to 63·6 effective horse power. There is an accumulator 18 inches in diameter and 20 feet stroke, loaded to 610 lbs. per square inch. The charges were originally intended to be £52 for one crane per annum, and less for several cranes in one warehouse. The charges are, however, by the quantity of water supplied as measured by a meter. The minimum charge is £8 per machine per annum. The charge by quantity of water used ranges from £8 per annum for 16,000 gallons or less, to £200 for 1,200,000 gallons, with special rates for greater quantities. The Liverpool and London schemes have already been described in the JOURNAL.* In Birmingham, as in Liverpool, water has been supplied from the town mains to operate lifts. In 1888 there were 61 lifts and hoists thus worked; using 80,000 gallons of water per day, and bringing to the Water Committee of the Corporation a return of about £1000 a year. Since that time a high-pressure system has been carried out, which has the peculiarities that it belongs to the Corporation, and that the pumping is done by gas-engines. At the pumping-station, there are three sets of triple hydraulic pumps, working to a pressure of 730 lbs. per square inch. These are driven by three "Otto" gas-engines, nominally of 12, 20, and 20 horse power, but capable of developing an aggregate of about 100-horse power. Ordinary illuminating gas is employed. The pumps deliver into the 6-inch mains. There are two accumulators, with 20-inch rams and 20-feet stroke. A small Brotherhood engine, worked by the pressure water, is used in starting the gas-engines. In Manchester, a combined scheme for supplying electricity and high-pressure water is being carried out. A pressure of 1000 lbs. per square inch in the hydraulic system is to be used.

Coming to the low-pressure or reservoir systems, the lecturer cited the Zurich as a very complex, but at the same time very interesting one. It was the earliest example in Switzerland of the application of hydraulic power—partly to pump a supply of potable water, partly to furnish motive power from the same central station. It has grown gradually, and has of late been greatly extended. The total effective horse power delivered by the turbines in the River Limmat is 1036. There are two reserve steam-engines, of 300 indicated horse power each, to provide for a deficiency of water power. At the pumping-station there are eight pressure (Jonval) turbines, working up to from 96 to 100 horse power, according to the state of the river. There are also two newer ones, of about 175-horse power each. The turbines have vertical shafts; and each pair drives, by bevel-wheels, a common horizontal shaft, which runs at 50 revolutions per minute, in the case of the earlier turbines, and at 66 revolutions per minute in the case of the two last erected. From these shafts a horizontal main shaft, 328 feet in length, and running at 100 revolutions per minute, is drawn. To this shaft, any of the pumps may be coupled. The earlier turbines cost, with gearing, about £12 per horse power; the two

* See Vol. LIX., p. 247; and Vol. LXI., p. 184.

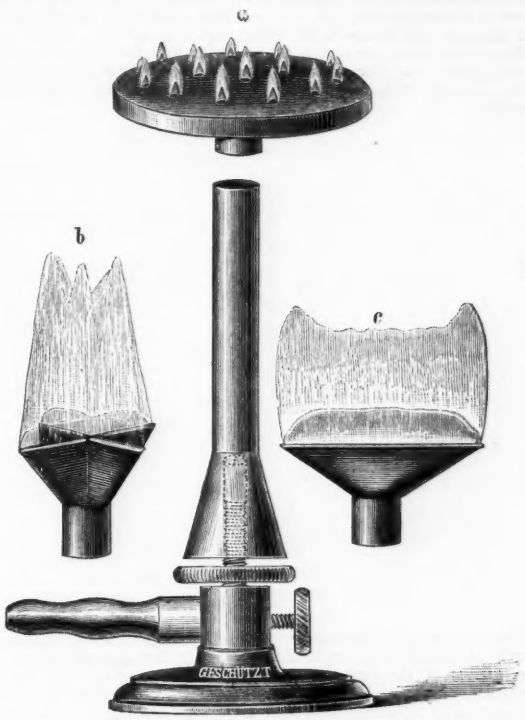
larger turbines, about £7 per horse power. There are at present in operation seven sets of horizontal double-acting Girard pumps. The total pumping capacity is 8,143,000 gallons per day. The water required for driving the turbines is obtained by a weir in the Limmat, which deviates the water into a canal formed by a longitudinal embankment in the river. From the town mains water is supplied to work 180 small motors. The total power thus supplied is about 187-horse power; and its cost is about 4·4d. per horse-power-hour. The principal supply of power, apart from that distributed by means of wire rope, is obtained from pressure water procured from the old Limmat filter-bed, and lifted to the special high-level reservoir. This water is pumped chiefly during the night. The reservoir is about 6000 feet from the pumping-station, and is supplied by an 18-inch main. The effective pressure at the motors is about 475 feet; and the distributing-mains have an aggregate length of 15,000 feet. The charge for this pressure water for power purposes varies from 0·6d. per horse-power-hour, when at least 50,000 horse-power-hours are taken in the year, to 1·25d. per horse-power-hour, when less than 20,000 horse-power-hours are taken in the year. For 3000 working hours in the year, the charge is from £7 10s. to £16 per horse power per annum. The water supplied this way now amounts to 42,380,000 cubic feet per annum; yielding altogether about 900,000 horse-power-hours. The total receipts are £1200 per annum, or 1·08d. per 1000 gallons. Besides this supply of pressure water to various consumers, the electric station is ordinarily to be driven by pressure water from the same high-level reservoir.

The lecturer next gave an account of the Geneva installation (incidentally alluded to in the previous lectures), which he characterized as one of the most remarkable hydraulic power stations in the world. The water of the River Rhone, near the point where it flows out of Lake Leman, is employed to drive a number of large low-pressure turbines, giving a total of 4500 effective horse power. These turbines pump pure water obtained from the lake into two systems of mains. The older of these, termed the low-pressure system (the pressure at the pumps being 160 to 200 feet), is an extension of a previously existing system of mains used for supplying potable water to the town of Geneva. The second system of mains, termed the high-pressure system (the pressure at the pumps being 460 feet) supplies potable water to some districts not reached by the low-pressure system; but it is specially intended to afford a supply of water for motive power purposes to the entire area of the town. The demand for water, both on the low and the high pressure system, is a fluctuating demand, large during the day, and very small during the night. Hence, if the turbines in the Rhone were employed solely in pumping into the mains, they would not be continuously working, and a large part of the water power of the river would be wasted. To meet this difficulty, an important storeage reservoir has been constructed at Bessinges, about 4 kilometres from Geneva. The turbines pump water up to this reservoir at night, and at times when the demand for power for other purposes is insufficient to keep them fully employed. The energy derived from water flowing back from the Bessinges reservoir through the high-pressure system represents part of the water power of the Rhone, which would necessarily have been wasted if this means of storeage had not been provided.

Professor Unwin next described the turbines, the high-pressure reservoir, the compensating pressure regulator, and the motors employed in the general installation; and he concluded his lecture with a few remarks on the electric lighting station, the motive power for which is furnished by the pressure water supplied by the Municipality.

THE TECLU GAS-BURNER.

The "Universal" gas-burner patented by Professor N. Teclu, and manufactured by Herr F. Hugershoff, of Leipsic, has been adopted by the heads of several important laboratories in Germany, and has received favourable comment in the technical press of that country. From the accompanying illustration, it will be seen that the appliance is essentially a modification of the Bunsen burner. From the foot of the burner projects vertically a hollow spindle, provided with a screw-thread, on which a milled-edged disc works. The top of the spindle enters the burner-tube, the lower end of which is funnel-shaped, and supports it. On the side of the foot immediately opposite the gas inlet-tube is a screw with milled head, by turning which the end of the screw can be forced into the orifice of the supply-tube, and limit the quantity of gas admitted by the latter. The gas passes from the inlet-tube up the hollow spindle to the burner-tube. If the milled disc is at its highest position, it completely closes the funnel-shaped end of the burner-tube; and, on ignition, the gas burns with a luminous flame at the top of the tube. But if the disc is lowered slightly, air is drawn up the funnel-shaped end of the tube, and diminishes the luminosity of the flame, or in the lowest position of the disc destroys it entirely. The moveable disc permits the exact regulation of the air supply, as the screw at the foot does that of the gas. The burner is made in two sizes; the tube being 16 mm. internal diameter and 145 mm. high in one, and 10 mm. internal diameter and 100 mm. high in the other. According to the *Chemiker Zeitung*, tubes of potash glass, 18 mm. in diameter and of 2 mm. thickness of material, can be readily bent with the smaller



sized burner. With the mouth of the tube contracted by an attachment to a slit 2 mm. in width and 55 mm. long, and with the disc in a low position, a copper wire 5 mm. in diameter can be raised to its melting-point in one minute. Tops are supplied to enable the burners to be used with the best effect for divers purposes. In the illustration, *a* is the ordinary mushroom top, supplied in two sizes according to the size of burner; *b* is a cross-burner top, formed of two slits bisecting one another; and *c*, a slit top for heating tubes, &c.

The Management of the Cambridge Gas-Works.—We learn that the managership of the Cambridge Gas-Works, rendered vacant by the death of Mr. W. Duesbury, as recently announced in the JOURNAL, has been conferred upon Mr. W. Weeks.

A Caution.—We have been asked to warn gas managers and others likely to be called upon by a man who represents himself as a son of Mr. J. L. Cocker, the Secretary and Manager of the Merthyr Tydfil Gas Company, and attempts to raise money by the plausible story he tells. At all events in one instance he has succeeded in "borrowing" a small sum under false pretences; and others are likely to be "favoured" with a visit from him. He is said to be a well-dressed man, about 5 ft. 10 in. high, and spare in figure. He has sharp features, is dark, with shaved face, and looks to be over 30 years of age. He is very gentlemanly in manner, and apparently well educated. It is certain he is not entitled to claim the connection he does with Mr. Cocker, inasmuch as both Mr. Cocker's sons are nearly 7000 miles away—in Arizona.

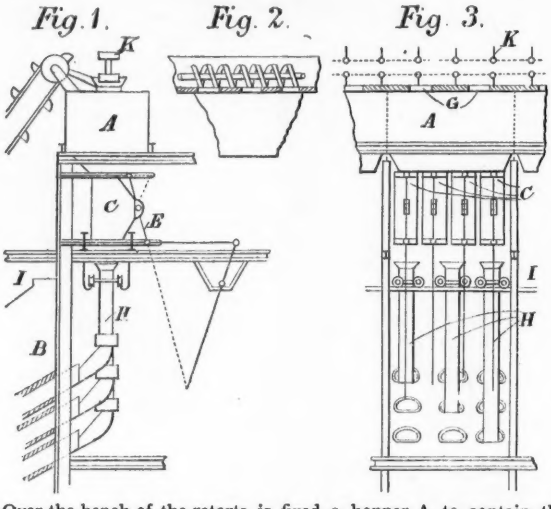
Mr. H. Percy Boulnois on the Duties of Municipal Engineers.—At the opening meeting for the present session of the Liverpool Engineering Society, the President (Mr. H. Percy Boulnois, M.Inst.C.E., City Engineer of Liverpool) delivered his Inaugural Address, the subject of which was municipal engineering. He pointed out that this branch of the profession did not exist sixty years ago, and that the Corporation of Liverpool in the year 1846 first legalized the position of the Borough Engineer, which was followed by the Legislature in the Public Health Act, 1848. He then proceeded to describe the early struggles of the municipal surveyor, when he suffered from what he (the President) styled "the cheeseparing economies of a frozen community." He drew a picture of the want of sanitation fifty years ago, when there was little or no sewerage of any kind, and cesspools honeycombed the earth; and he pointed out that all this had been changed mainly through the work of the municipal surveyor. He then explained the various duties of this official, and said his miscellaneous acquirements included legal knowledge, surveying, and administration generally. He said he did not think he had exaggerated the work which a municipal surveyor is expected to know and perform; but on the contrary, there were several subjects he had purposely omitted. For instance, in some towns the surveyor was also sanitary inspector and gas-works manager; while in others he was the chief rate collector, as well as captain of the fire brigade.

REGISTER OF PATENTS.

Charging Inclined Gas-Retorts.—Van Vestraut, L., and Graham, M., of Leadenhall Street, E.C. No. 20,709; Nov. 16, 1892.

In the arrangement of apparatus for charging inclined gas-retorts shown in the engravings, fig. 1 is a vertical section of the retort-bed, with hoppers and shoots in elevation; fig. 2 is a view of an Archimedean screw conveyor above the receiver; and fig. 3 is a front view of the hoppers and shoots placed in position for charging in the mouth of the retorts, with a scraping conveyor to fill the receiver with material.

Fig. 1. *Fig. 2.* *Fig. 3.*



Over the bench of the retorts is fixed a hopper A, to contain the supply of broken coal required for charging the several retorts. At the bottom of the hopper are doors or slides of suitable pattern. Division-plates are fixed inside, so as to form compartments if necessary, and also to strengthen, and be a support to, the sides of the hopper—necessary stays being fixed, which support the conveyors and other machinery for filling these hoppers. Upon the bottom of the main hoppers are fixed permanent secondary hoppers or measuring chambers C; and at the top and bottom of the hoppers are slides or valves, worked by means of levers E, preferably fixed so that when the top slide is open the bottom is shut, and *vice versâ*. The object of the bottom slide is to prevent the coal falling down the shoot before the chamber is filled and ready for charging; while the object of the top one is to prevent the coal falling into the chamber from above during the operation of charging, and so increasing the already measured charge. The slides are fixed in the measuring chambers, and not in the large overhead hoppers.

Measuring chambers are also used separately, and not in conjunction with the large hopper A. They are fixed full length of the retorts, and filled by means of a scraping conveyor K, Archimedean screw (as in fig. 2), truck, or other suitable means. The chambers may also have the top and bottom doors, as before described; although the top door may be built in the conveyor trough, if preferred.

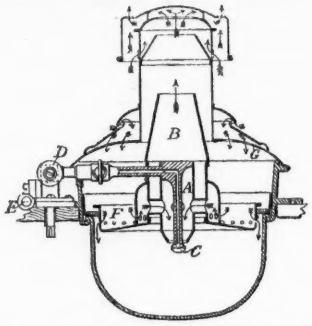
The capacity of the chambers, and the quantity of coal per charge, is regulated by moveable slides (pivoted), swing-flaps, doors, valves, partitions, and moveable sides—thus increasing or reducing the charges as required. The weight of the charge can also be governed by using a measuring chamber under the main hopper, and supported by or fixed upon springs, so that, when the required weight of coal is deposited in the chamber, it will raise or lower, and in doing so come in contact with, levers directly or indirectly connected to the top or bottom slides, thereby opening or shutting them as preferred for successful working.

Conveyors of any desirable pattern are used for supplying the coal for the charges, and also for conveying the coal to the place required. The coal is distributed along the hoppers; the conveyor filling and levelling it as it travels on, or it scrapes the coal along a trough with a number of openings G in it, so that, when the receptacle is filled up to the outlet of the trough, the conveyor scrapes on to the next opening, and so on. Upon arriving at the end of the hoppers, the surplus coal is shot down an overflow spout, upon the floor of the retort-house, or into a moveable waggon to be conveyed again to the coal-stack. Underneath these hoppers are shoots H, which direct the flow of coal into the retort, and check the speed of the coal before entering the retort; thus securing an even layer of coal, distributed throughout and upon the floor of the retort. These shoots may be pushed along the overhead rails I on wheels, as shown.

Regenerative Gas-Lamps.—Thomas, T. C. J., of Finsbury Park, N. No. 22,033; Dec. 1, 1892.

This invention relates to a regenerative gas-lamp, in which a portion of the gas-supply pipe, the burner, air-heating chamber, and chimney are combined and arranged in such a manner that they can be turned on a hinge or joint, so that all the parts are easily removable for cleaning or other purposes, and "are easily replaceable without special adjustment of the parts each time they are replaced."

A is an air-heating chamber or regenerator, provided with a chimney B, and with a central gas-pipe carrying a burner C. These parts (which may be of any suitable construction) are combined together, so as to form practically one piece, jointed at D to a support, so that the combined air generator and chimney, and the gas supply-pipe can be turned about such hinge as a centre. The support is fixed to the lamp-casing, upon which the horizontal portion of the gas supply-pipe normally rests, so as to support the air regenerator and attached parts in position for use, as shown; and the support has formed therethrough a passage, by which the gas supply-pipe is placed in communication with the main gas supply-pipe E. F is the reflector, connected to the air regenerator A, so as to move therewith. But, in



order to obviate the necessity of specially adjusting the combined parts when turned on the hinge or joint D into position for use, and so that the top of the lamp-bowl shall be closed when the parts are in the closed position, the reflector has an external ring, which is free to adjust itself in a vertical sense, and is adapted to rest either upon the rim of the bowl or upon the ring which serves to confine the rim in place, and which is secured within and to the lamp-casing. G is the lamp head or cover, hinged to the casing, and provided with air inlet-passages and with baffle-plates, to assist in ensuring a steady flow of air to the regenerator, to the exterior of which may be fixed, for a like purpose, a perforated baffle-plate.

By this construction, says the patentee, it will be seen that the combined air regenerator, chimney, and gas-pipes can, after turning back the lamp head or cover, be easily and quickly turned upward and outward about the hinge or joint D as a centre, so as to permit of access to any of the combined parts, or to the lamp-bowl, for cleaning or other purpose; also that the parts can be afterwards easily and quickly replaced, without special adjustment of the parts each time they are replaced.

Firing Retort-Benches with Gas.—Newton, H. E.; communicated from R. N. Oakman, of Greenfield, Mass., U.S.A. No. 22,095; Dec. 2, 1892.

The object of this invention is to make use of the producer gas formed in large quantity in water-gas plant in the process of "blowing up," in order to heat retorts specially designed for the manufacture of carburetted water gas.

Fig. 1 [p. 851] is a longitudinal sectional elevation of a double bench of retorts, and a sectional plan of same; and fig. 2 is a transverse section and front elevation of the bench.

A is an air-heater, of any convenient form, heated by the waste gases passing away after the retorts in the bench have been heated. The retorts, which in the present case are preferably made of iron, are provided with mouthpieces X and ascension-pipes Y, connecting the mouthpieces with the hydraulic main Z; and they are carried by firebrick arches in the retort-chamber F, in the usual way. W is the fuel-gas pipe in connection with the gasholder. This pipe is connected by branch pipes D with the gas-burners B. The burners B are metal pipes, oblong in cross section, set on edge; and two burners are employed for each bench of retorts. The burner-pipes are connected at the back by a passage H, and at the front by another passage, so that the pressure shall be equal on the two pipes. Near the top, the pipes B have lateral openings into a central passage or chamber K (the combustion chamber). Below this chamber K, and separated therefrom by a horizontal partition, is a second or air chamber, connected with the air-heater A by the pipe E. This air-chamber communicates with the combustion chamber K, by means of small vertical passages in the partition. These passages are arranged to correspond with the gas openings, so that the air issuing from the passages shall cross the gas issuing at right angles, in order to ensure a good mixture. Immediately outside the burners B, or separated therefrom by a thin partition, are flues G, by which the waste gases from the bench are carried off, to heat the air-heater before passing to the shaft. Air to support combustion enters under pressure at V; and the gas passes under pressure from the holder, through the pipes D, to the burners B. The water gas to be carburetted enters the retorts by the pipes L; and the oil for carburetting arrives by the pipe M, so as to enter the retorts with the gas.

Burners for Gas-Grills.—Dick, W. B., of Putney, S.W. No. 5826; March 18, 1893.

The patentee's object being to construct a gas-grill burner so that it can be utilized for boiling or grilling without having occasion to interfere with the fret, which is a fixture, the invention consists in casting or otherwise fixing to one side of the grill a snug, having a groove into which one end of the burner rests. At the other end of the burner, there is a small knob or handle, which projects through a slit in the top of the grill. On the knob being turned or pulled, the flame is raised or lowered, so that it plays above or below the fret, as may be desired, without the necessity of moving the fret.

Gas or Oil Engines.—Boult, A. J.; communicated from La Société Française des Moteurs Crébessac, of Paris. No. 14,891; Aug. 3, 1893.

This invention relates to a motor which is adapted to work either with petroleum, coal gas, or oil. The principal new features of the motor are: (1) The system of working the admission and exhaust valves by a single cam; and (2) the special carburettor for charging the air in the interior with petroleum vapour.

The motor is of the four-cycle type, comprising: (1) Aspiration of the explosive mixture; (2) compression of the same; (3) ignition of

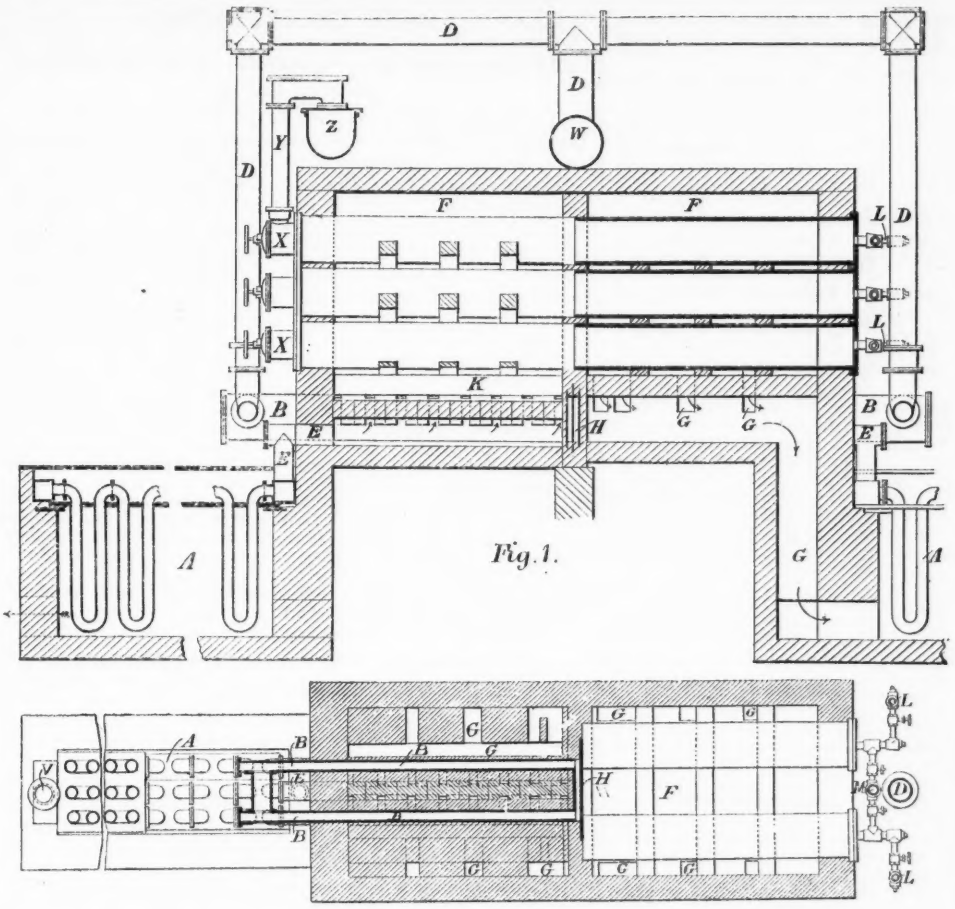


Fig. 1.

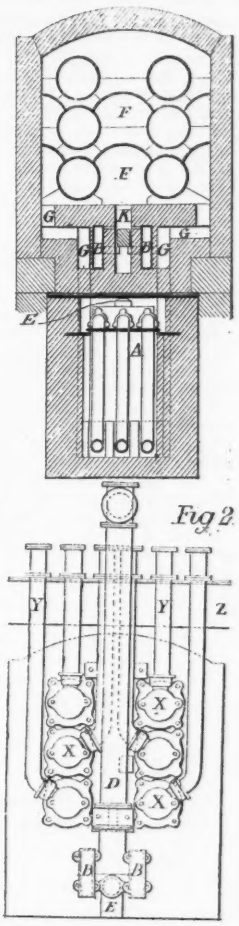


Fig 2

the explosive mixture, giving the impulse to the piston on its outward stroke; (4) exhaust. The motor is said to differ from those hitherto in use "in the special construction of the carburettor (for petroleum engines), and in the arrangement of distributing the gas and effecting the exhaust by the means of a single cam; further, in the special arrangement of the exhaust and admission valves for the explosive mixture; and, finally, in the inlet-cock for the gas, which cock serves at the same time for distributing the gas." The explosion is effected by means of electricity, through a Rhumkorff coil in connection with an insulated ignitor of china, fed from a battery consisting of two elements.

The claims for the invention are: (1) Operating the admission and exhaust valves of gas-engines by a single cam having only one rising part, which latter operates successively on the ends of pivoted levers for moving the valves; the levers being arranged so as to form an angle of 115° one with the other and with the centre of the cam. (2) The arrangement of carburettor, consisting in forcing the air sucked in by the action of the motor through and across a series of short iron rods, which reach into the liquid for the purpose of obtaining a larger surface for contact with the air.

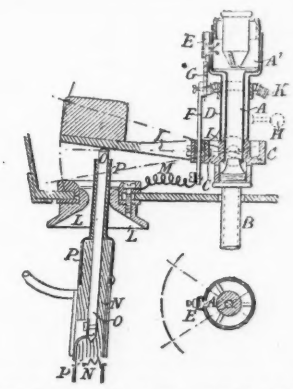
Filters.—Koch, H., of Halle, Germany. No. 15,831; Aug. 21, 1893.

This invention relates to the manufacture of a filtering material and the construction of a filter for more effectually purifying water. The filtering material employed consists of specially-prepared coke powder, produced by heating coal to a red heat without access of air—that is to say, subjecting it to dry distillation. Then, after the heating, it is quenched with water, and then washed and dried. After drying, the coke is pulverized, and prepared as follows: Three parts of readily fusible caustic alkali or carbonate of alkali are first melted. Two parts of the ground coke are then stirred into the thin fluid mass; and the mixture is kept for some time with constant agitation at a red heat. After cooling, the molten mass is pulverized, and the alkali is washed out with hot water. The residue (the coke), which is still alkaline, is slightly acidified with hydrochloric acid and water; and then it is washed again till its reaction is neutral. It is then dried, and placed in a filter, in which there are several cylindrical partitions, so as to cause the liquid to flow from one layer to the other by means of a special dish and cups.

Lighting Gas by Electricity.—Geyer, A., and Stegmeier, J., of Gmünd, Würtemberg. No. 16,074; Aug. 25, 1893.

As shown in the illustration, the burner-tube A, constructed according to this invention, is in its upper part enlarged to the burner proper, and is fed from below by the gas-pipe B, terminating with a nozzle reaching into the burner-tube and surrounded by apertures provided within the casing or body C. The air, on entering, mixes with the gas within the tube, and is mixed at the top of the burner; so that the "hollow mineral-cylinder" arranged above the burner (but not shown by the patentees in their drawing) is brought to "a state of intense glowing."

The burner-tube, with its enlarged head, is surrounded by a tube D of corresponding shape, resting on the body C, and adapted to be turned for about one-fifth of one rotation. The head of the outer tube has an opening, passing a similar opening when the tube D is rotated. A small casing E is secured in front of the latter opening; and gas will flow into the channel formed by the casing, as soon as the openings coincide.



A metal bar F fixed to the body C, and isolated from the latter by rubber-pieces, is provided at its head with a contact-brush G, the projecting elastic wires of which extend into the casing before mentioned—that is to say, they extend into the casing when the openings coincide, as in the drawing. Thus, when the casing E in the course of its motion is passing away over the extremities of the wires, contact will be established between the wires and the casing. If, now, the bar F as well as the body C are connected with the poles of any source of electricity, and if, further, the tube D is turned (for instance, by the handle H), the gas escaping through the openings now coinciding will be ignited by the sparks arising between the edge of the casing E and the wires; and, by the flame thus produced, the main part of the gaseous mixture will be ignited at the top of the burner.

The parts thus far described are sufficient for effecting the desired result, if the apparatus can be operated directly by hand, and if the body C and the bar F are in constant connection with the electric generator. If, however, the burner with its igniting-device is arranged in a street-lantern, an intermediate device is needed, by the aid of which the apparatus may be operated and connected with both poles of an electric generator at a time. This auxiliary device is constructed as follows: A bell-crank lever I fulcrumed to the body C is provided at the end of its shorter arm with a toothed sector K meshing with a cog-wheel on the tube D, while the longer arm of the lever carries a weight. A

metallic socket L of funnel shape is fixed to the bottom S of the lamp, and isolated from it by rubber rings—one supporting the weighted arm of the lever I, when the latter is in its normal position, or out of use. The socket L and bar F are connected by the wire M. The lamplighter would carry with him a wooden rod N, containing in its under part a device by which an electric current may be generated—as, for instance, a small but powerful primary or secondary battery. To the top of the rod is fixed a metallic rod O and a tube P, which are connected by the wires R with the two poles of the electric generator, and, as a matter of course, isolated from each other. If, now, the top of the rod is introduced into the socket L, and the tube P is brought in contact with it, and if, further, the lever I is lifted by the rod O, the electric circuit will be completely closed as soon as contact is established, and the gas will be ignited by the sparks arising therefrom.

Ignition of the Charges in Gas Motor Engines.—Brünler, O., of Leipsic, Germany. No. 16,751/52; Sept. 6, 1893.

These inventions relate to gas-engines with slow combustion—viz., in which the organs admitting the combustibles remain open, and the combustion lasts as long as the piston takes to entirely (or at least partly) effect its stroke.

The motors of these kinds used till now, says the patentee, have the drawback that the maintenance of the combustion during the admission-period of the combustibles is altogether uncertain. Even though ignition may be effected by an ignition-pipe, the maintenance of the combustion is uncertain, because it is difficult to keep the speed of the combustion in accordance with the speed of admission of the combustible mixture. It occurs at times that, as soon as the mixture is ignited, a sudden expansion takes place; and this expansion causes the currents of air and combustibles to be stopped, and the combustion interrupted.

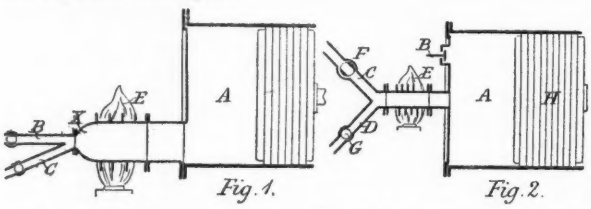


Fig. 1.

Fig. 2.

To meet this inconvenience, according to fig. 1, the cylinder A is supplied with compressed air through the pipe B; and with gas, through the pipe C. The ignition-chamber E is heated by the flame D. From the point X, where the mixture is ignited, the ignition-chamber is expanded; so that, in spite of the expansion of the burning mixture, the pressure is not considerably increased. Consequently the combustible mixture streams in without hindrance.

In fig. 2, A is the cylinder, in which the piston H works. The pipe C admits compressed air; and the pipe D, gas. The mixture of both is ignited in the chamber E; and during the admission of compressed air and gas, it pushes the piston forward. The valve B lets the waste gases escape. To obtain the result mentioned, the closing organs F G of the pipes C and D are opened before the waste gases have entirely escaped through the valve B; and the latter is closed, so that the combustible mixture enters the ignition-chamber E. Consequently, as the piston stands almost still for a short space, the entering mixture is stopped for a time; and so the commencement of the ignition must take place without fail.

APPLICATIONS FOR LETTERS PATENT.

19,434.—Brookes, A. G., "Gas-retorts." A communication from F. D. Marshall. Oct. 16.

19,442.—Woodward, J., "Junctions or connections between service-pipes and the mains for supplying gas or water." Oct. 16.

19,447.—Fisher, W. E., "Gas-lamps." Oct. 16.

19,520.—Clark, F. W., "Carburetting or enriching gas." Oct. 17.

19,521.—Kitson, A., "Producing gas." Oct. 17.

19,533.—Bell, W. C., "Charging retorts in gas-works." Oct. 17.

19,560.—Candy, F. P., "Precipitation of sewage and polluted waters." Oct. 18.

19,564.—Stead, G. W., "Attachment for gaslight burners for heating purposes." Oct. 18.

19,585.—Williams, J. N. S., "Reciprocating pumping machinery for exhausting or compressing air, vapour, or gas." Oct. 18.

19,587.—Cowan, W., "Prepayment gas-meters." Oct. 18.

19,611.—Eckl, F., "Incandescence bodies for incandescent gas-lights." Oct. 18.

19,921.—Dickinson, H. Y., "Time apparatus for automatically switching gas and electric lights." Oct. 23.

20,010.—Batty, T., "Atmospheric gas-stoves." Oct. 24.

20,075.—Long, F. W. D., Evans, W. S., and Hawes, M. H., trading as the Art Lamp Manufacturing Company, "Automatic cock for gas-stoves." Oct. 24.

20,104.—Sharp, T. B., "Valves, cocks, or taps for controlling the egress of liquids or gases from pipes, tanks, boilers, &c." Oct. 25.

20,152.—Clerk, D., and Lanchester, F. W., "Gas and like engines." Oct. 26.

20,215.—Wanklyn, J. A., and Cooper, W. J., "Manufacture of gas for heating and illumination." Oct. 26.

20,303.—Ennis, T. F., and Waller, B. B., "Gas-stoking tool." Oct. 27.

20,306.—Jones, G. H., "Gas-stoves and cooking-ranges." Oct. 27.

20,319.—Mondey, A. E., and Tubb, H., "Gas and vapour engines." Oct. 27.

20,330.—Koblenzer, M., "Incandescent gas-burners." Oct. 27.

20,407.—Elster, J., "Atmospheric gas-burners." Oct. 28.

Crideock Water-Works Company, Limited.—A Company has been registered under this title, with a capital of £1000, in £5 shares, to supply Crideock, in Dorsetshire, with water.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Saturday, Nov. 4.

(*Before the* Master of the Rolls *and Lord Justice* Kay.)

Corporation of Southport v. Assessment Committee of the Ormskirk Union and the Overseers of Birkdale.

This was an appeal from Justices Cave and Wright, who decided, on July 17 last (see *ante*, p. 173), in the Divisional Court, that the Corporation of Southport were not liable to be rated in respect of the gas-mains in the township of Birkdale, through which they had power to send their gas, but which remained the property of, and were maintainable by, the Local Board of Birkdale.

Mr. Poland, Q.C., and Mr. A. T. Lawrence appeared in support of the appeal. Mr. Leese, Q.C., and Mr. S. T. Evans, represented the Corporation of Southport; but they were not called upon.

The Master of the Rolls, in giving judgment, said the case was as clear as possible. The Local Board of Birkdale were the statutory owners of the pipes in question, and occupiers of the land in which the pipes lay. They had not given up possession of them to the Southport Corporation, but had only granted them the use of the pipes for the purpose of supplying gas. The judgment of Mr. Justice Cave was perfectly right; and the appeal must be dismissed.

Lord Justice Kay concurred. He said he thought it was impossible to maintain that the Corporation of Southport, who had the exclusive use of the pipes for sending gas through them, had anything more than an easement; and therefore they were not lessees or occupiers of the land in which the pipes had been placed.

The appeal was therefore dismissed; but it had been agreed between the parties that there should be no costs.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Monday, Oct. 30.

(*Before Mr. Justice* Romer.)

Mallmann and Co. v. Buenos Ayres Water Supply and Drainage Company, Limited, and Others.

Mr. Moulton, Q.C. (with him Mr. Pollard and Mr. Ingle Joyce), said this was an action brought by bankers in Paris to prevent the defendant Company from rescinding a contract with regard to water-works at Buenos Ayres, and claiming damages. However, since the action was brought, the contract had been carried out with the Argentine Government; and therefore the only claim now remaining was one of damages. Proof of actual damage was essential to maintain the action; and this evidence was, of course, in the possession of the Argentine Government, from whom the plaintiffs had not been able to obtain discovery. The evidence which had been obtained, apart from this, had been laid before himself and his learned friends, who were with him; and they had come to the conclusion that it was not sufficient to support the onus which was upon the plaintiffs. Under these circumstances he had advised his clients to consent to the action being dismissed, and to pursue a remedy which they had elsewhere.

Sir R. E. Webster, Q.C. (with him Mr. Neville, Q.C., and Mr. Carson), for the Company, said he did not assent to the proposition that there were any materials in possession of the Argentine Government which would support the statement of his learned friend.

Mr. Cozens Hardy, Q.C., who (with Mr. Haldane, Q.C., and Mr. Kirby) appeared for Messrs. Baring Bros., pointed out that his clients had been charged with fraud; and no evidence had been given to support the charge.

His Lordship dismissed the action, with costs.

Tuesday, Oct. 31.

Stretton's Derby Brewery Company, Limited, v. Mayor and Corporation of Derby.

This was an action for an injunction to restrain the Corporation of Derby from permitting sewage to flow from their sewer into and upon the premises of the plaintiffs in Ashbourne Road; and for damages in respect of injuries already sustained.

Sir E. Clarke, Q.C. (with him Mr. R. C. Glen), for the plaintiffs, said the sewer in question was laid down in 1854; and at the time it was made, the population of the district was very small. It started about 700 yards above the plaintiffs' brewery, and ran to a point about 1000 yards below it, where it emptied itself into a large culvert which ran for about 1100 yards, and carried matter from the sewer in question and another sewer into the River Derwent. The sewer was constructed in such a manner that there was a continuous line at the bottom; but it had been enlarged at different points by being raised. Where it commenced, it was a 9-inch sewer. It was afterwards enlarged to 12 inches; and near the brewery it had been again increased to 2 ft. 6 in. in height and 1 ft. 8 in. in width. All the connections from the brewery with the sewer had been approved by, and carried out with the sanction of, the Local Authority. On several occasions the plaintiffs had to complain that from the sewer there came a considerable rush of sewage into their cellars, and this not at times of abnormal or unexpected flood, but when the conditions were such that, with a properly constructed sewer, the flooding could not have happened. He believed it would be said that the trouble was entirely due to the fact that the level of the cellar was below the effective level of the sewer in the street; and that, no matter what size sewer there was, the flooding would occur. But evidence would be called to show that this was not the case. The real cause of the whole mischief was that the sewer was not large enough, having regard to the number of houses which had been erected since 1854, and were now connected with it.

A large number of scientific witnesses were called to speak to the

amount of damage already sustained, and to prove that, in order to prevent the recurrence of flooding, the reconstruction of the sewer was an absolute necessity.

Wednesday, Nov. 1.

Mr. R. NEVILLE, Q.C. (with him Mr. GRAHAM), for the defendants, said that to remedy what was complained of meant a radical alteration in the construction of the sewer. He submitted that the plaintiffs had no legal right to this, and that the Court had no jurisdiction to grant an injunction. The damage had been solely caused through excessive rainfall.

Justice ROMER: As I understand the defence, it is that, if this were a common-law action for damages, plaintiffs could not succeed; and further that, if they could have an action for damages, the present is not a case in which the Court would interfere.

Mr. NEVILLE said the plaintiffs, in order to succeed, must show that the Sanitary Authority, having brought a "dangerous animal" upon their (the plaintiffs') land, were, in consequence thereof, under the obligation, in the eye of the law, to keep it from doing an injury. If the plaintiffs were right in their contention, every individual ratepayer might commence an action against the Local Authority. If the system of drainage was insufficient, the proper course was to apply for a *mandamus*, or to take proceedings under the Public Health Act.

Thursday, Nov. 2.

The following evidence was called to-day on behalf of the defendants:—

Mr. *T. C. Thornman*, Consulting Engineer to the Corporation of Birkenhead, stated that from 1854 to 1864 he occupied the position of Borough Engineer at Derby. The sewer in question was constructed under his directions. Before starting it, he ascertained the district to be drained, and also the levels of the cellars. There were no cellars at that time so deep as those of the plaintiffs. The sewer was amply sufficient for all the requirements of the district.

Mr. *R. J. Harrison*, the present Borough Engineer of Derby, said the sewer was a well-constructed one, and had an excellent fall. The brewery cellar was too low in relation to the sewer. The effect of increasing the size of the sewer in the Ashbourne Road would be to intensify the flooding in the lower part of the town. A firm of engineers were engaged in considering the present system of drainage in Derby; and they would shortly present their report. There was no difficulty, from an engineering point of view, in reconstructing the sewers; the only trouble was in the disposal of the sewage. This was the sole cause of the delay.

Mr. *H. G. Harris*, M.Inst.C.E., a partner of Sir Frederick Bramwell, deposed that his firm were engaged in devising a scheme for the disposal of the sewage of Derby. There was no engineering difficulty, if the Derby Corporation would provide money enough; the thing was to dispose of the sewage after it had been collected. The reconstruction of the drainage system in a town like Derby would be exceedingly costly. Roughly speaking, the heart of the town was in a basin, through which the river flowed. In the low part there were frequent floodings from the river, and from water brought down from the high grounds. From the plaintiffs' point of view, it would be a good thing to enlarge the sewer; but from the point of view of the inhabitants of Derby, it would not. The sewer was amply sufficient for the district it had to drain. It would deal with 0·4 inch of rain falling regularly over an hour.

Cross-examined: In London sewers, storm overflows were provided; but if they were constructed at Derby the lower part of the town would be flooded.

Sir E. CLARKE, in replying upon the whole case, said he did not ask for an injunction to compel the Local Authority to do something which would be of benefit to the plaintiffs, in the sense of improving their property; but they certainly complained of sewage being deposited on their premises through connections which had been approved of. The wrongful act of the defendants was in allowing too many houses to connect with the sewer. It might be said that persons who built houses were entitled to drain into the sewer; but if the authorities knew that the sewer was insufficient for its purpose, they were not justified in allowing the additional communications to be made. Their duty was either to enlarge the sewer or to make a fresh one.

His LORDSHIP reserved judgment.

Saturday, Nov. 4.

(*Before Mr. Justice* CHITTY.)

Luke v. Guernsey Water-Works Company.

This case came before the Court on a motion for judgment—the defendants not objecting. The Company was incorporated in October, 1888, for the purpose of establishing water-works in Guernsey. By the Memorandum of Association, they had power to issue debentures; and this they did in 1889 to the extent of £20,000. These debentures, which were payable to bearer, became repayable on Feb. 2, 1895, or sooner if the Company should go into liquidation. The latter eventuality has come about; and the plaintiff, who is the holder of nine debentures, now asked for the usual order in a debenture-holder's action as to the debentures outstanding and the amount due thereon.

Mr. A. JAMES appeared for the plaintiff.

His LORDSHIP made the order as asked.

Additional Water-Works for Southampton.—At the last meeting of the Southampton Town Council, the Water Committee reported having considered communications from the Local Government Board with reference to applications for sanction to borrow money for proposed new works of water supply, and suggesting that the Corporation should apply for the issue of a further Provisional Order conferring additional borrowing powers in respect of their water undertaking. They unanimously recommended the Council to adopt the suggestion, and take all necessary steps to obtain a Provisional Order to enable them to borrow £20,000 for new works. The report was adopted.

MISCELLANEOUS NEWS.

THE CRISIS IN THE COAL TRADE.

The account of the progress of the dispute in the coal trade which appeared in the last JOURNAL gave promise of something like an understanding being soon arrived at by the contending parties. The events of the past week, recorded below, show how near that promise is to fulfilment.

The week opened with a meeting of the Executive of the Miners' Federation at Derby, called to decide upon the reply to be given to the offer of the coalowners to discuss the whole position of affairs without prejudice. Mr. B. Pickard, M.P., presided; and there were present the Vice-Chairman (Mr. S. Woods, M.P.), the Secretary (Mr. T. Ashton), and representatives from South Staffordshire, Derbyshire, Lancashire, South Wales and Monmouthshire, Somerset, Nottinghamshire, Yorkshire, and the London Coal Porters' Union. The meeting, which was private, lasted the whole of the afternoon; and at its close the Secretary informed the representatives of the Press that the following resolution had been passed: "That the Committee meet the coalowners at the earliest possible date on the subject of Mr. Ellis's letter—namely, to debate the wage question, without prejudice; and that the Secretary wire to the coalowners' Secretary to this effect without delay." They were further informed that the latter instruction had been duly carried out, and that the time and place of meeting had been left to the owners to determine. A suggestion having been made by the Durham coalowners that a Wages or Conciliation Board should be formed for the county, steps were taken by the Miners' Federation to obtain from the coalowners such information as would enable them to carry the idea into effect. On the London Coal Exchange, a spirit of caution governed the market; only the absolutely necessary purchases being made. The Midlands being better stocked with coal, a greater quantity was available for London. Gas coal sold readily where it was obtainable; as much as 17s. per ton into barge being realized.

The notable event of Tuesday was the announcement that the date of the joint conference of coalowners and miners had been fixed for the following Friday, at the Westminster Palace Hotel; and various were the opinions expressed as to the result. The owner of one of the largest collieries in Derbyshire stated that a proposition would be made for a 10 per cent. reduction at once, and another 10 per cent. reduction on April 1, 1894. He added that there had, of course, been a decided change in the situation. The miners, by their action, had "swept the deck" of coal, and enhanced and superficial prices would rule for the next six months. After that, things would have found their level; and, unless there was a reduction in wages, they would return to one or two days' work per week. He thought there was no likelihood of a settlement being agreed to at the joint meeting, unless the men accepted some reduction. On the other hand, Mr. Bailey, the agent of the Nottingham miners, in the course of an address to the men employed at the collieries of Messrs. James Oakes and Co., near Alfreton, said they were willing to meet the owners; but they would firmly resist a reduction. He was willing to enter into any honourable arrangement that might terminate the existing unfortunate dispute. In the whole Federation, there were nearly 100,000 miners at work; and if the masters would open their pits at the old rate of wages, the remainder of the men would go in. At a mass meeting of miners at Chesterfield, Mr. Haslam and Mr. Harvey, the Derbyshire leaders, said the circumstances in connection with the coal trade had so changed since July as to make it reasonable to expect, at the approaching meeting between the masters and men in London, that the men would be allowed to go in at the old rate of wages. A resolution binding the men to abide by any arrangement arrived at in London was unanimously passed.

On Wednesday, the Secretary of the Miners' Federation issued notices to the districts embraced in the organization, requesting them to send delegates to a special conference to be held at the Westminster Palace Hotel on Friday morning. It was expected that every district would be represented. The meeting was convened to consider and determine upon the policy to be pursued at the joint conference with the employers. The miners' conference, under the rules of the Federation, would have no power to effect any settlement of the dispute which would involve a reduction of wages; but if the employers withdrew their notices, and permitted the men to return to work at the full wage, the Federation would probably agree to the formation of a Board of Conciliation to consider future wages questions. The men were also, it was stated, prepared to take punitive action against coalowners who broke the markets by accepting low-priced contracts, if the Coalowners' Federation would continue with them to maintain selling prices and wages. The coalowners of South Yorkshire held a meeting at Sheffield, under the presidency of Mr. A. M. Chambers. The proceedings were conducted in private. A discussion took place as to the course to be pursued at the joint conference; and delegates were appointed to attend. There was a strong feeling among a certain section of those present that the owners must insist on a reduction. In support of this, it was urged that, though, owing to the scarcity of fuel, prices had risen to an exceptionally high figure, yet on a resumption of work there would be a great fall in rates; and unless employers obtained such a sum as would pay them to make stocks, the men would before long be again working only two or three days a week. A conference of Gladstonian members of Parliament was held at the National Liberal Club, to consider what action should be taken to bring about a settlement of the dispute. Mr. J. Hutton, Chairman of the London County Council, presided. The Hon. B. Coleridge, M.P., moved the first resolution, as follows: "This meeting desires to express its profound and sincere sympathy with the locked-out miners in their struggle to maintain for themselves and their families the minimum standard of living consistent with a decent existence, and pledges itself to support their cause in Parliament and in the country by every legitimate and available means." This was seconded by Mr. Lough, M.P., supported by Mr. Jacoby, M.P., Mr. B. Pickard, M.P., and Dr. Clark, M.P., and carried unanimously. The second resolution

was moved by Earl Compton, M.P., as follows: "That, any reason for the reduction of wages which may have been advanced at an earlier date having ceased to exist, this conference is of opinion that the miners should be allowed to return to work at the old rate of wages." After considerable discussion, it was agreed to withdraw the resolution, in view of the approaching conference of coalowners and miners' representatives. Several other speakers having addressed the meeting, it was agreed to hold a further conference to-morrow evening. On the London Coal Exchange, the principal topic discussed was the situation pending the announcement of the result of the conference. Merchants were disinclined to make purchases; and business was confined to absolute requirements. With increased consumption, the demand for coal suitable for gas-making purposes was more urgent; and those who had any to sell were able to make 17s. 6d. per ton *ex* collier in the Thames.

Thursday was, almost necessarily, uneventful; all parties concerned waiting for the conference fixed for the following day. A movement by the Parliamentary Committee of the Trade Union Congress, however, deserves to be recorded. The Committee met at their offices in Buckingham Street, and, having discussed the various phases of the dispute, decided to issue an urgent appeal to the organized workers of the United Kingdom and other bodies for prompt and generous assistance for the miners and their families.

The joint conference of representatives of the Coalowners' and Miners' Federations took place at the Westminster Palace Hotel on Friday, under the presidency of Mr. A. M. Chambers; the proceedings being conducted in private. It was stated that the delegates of the men made an offer to return to work at the old rates, and accept a reduction of 10 to 15 per cent. in January next, pending a final decision. No conclusion was come to; and the conference was adjourned till the following morning. After a sitting lasting upwards of two hours, the meeting closed without any settlement being arrived at. According to the report of the deliberations furnished to the Press, Mr. Chambers, on behalf of the coalowners, submitted a number of proposals, the first of which provided as follows: "There shall be a meeting of an equal number of coalowners' and miners' representatives, with the General Secretary of each body as *ex officio* members, and three other persons appointed to act as conciliators; and at such meeting or such adjourned meetings as may be agreed upon an endeavour shall be made to arrange terms of settlement." The gentlemen appointed to act as conciliators were to be agreed upon between the miners' representatives and the coalowners; and the duties of the conciliators were to be "to consider and inquire into the causes of difference which may arise between the coalowners' representatives and the miners' representatives, and endeavour to bring about a settlement of such differences." Pending a final settlement, "work to be immediately resumed on the following terms: (*a*) The 15 per cent. off the advance now in dispute shall not be retained by the employers or paid to the workmen, but shall be paid by each coalowner who is a party to this arrangement each week into a separate account at the bank, to the joint credit of the conciliators, to abide the decision of the Conciliation Board. (*b*) When the final settlement of the present dispute has been arrived at, the amounts so paid into the bank, with any accretions, shall be distributed to the employers or the workmen in accordance with the terms of settlement." After considerable discussion, Mr. Pickard, on behalf of the men, submitted the following alternative proposals: (1) "That the men resume work at the old rate of wages until the 1st of April, 1894." (2) "That the minimum or standard rate of wages be 30 per cent. above the wages rate of Jan. 1, 1888." (3) "That a Board of Conciliation be formed to deal with wage questions in the future from the above-named date." (4) "That the Board, when formed, shall have power to determine the rate of wages on and from April 1, 1894." Mr. Chambers, on behalf of the masters, said he regretted that they could not see their way to accept these propositions; and he thereupon submitted further proposals with a view to admit of the pits being at once opened pending a final decision by a tribunal to be appointed. Mr. Pickard, on behalf of the men, stated that he had no authority to agree to such a tribunal without discussing the matter with the men. This, it is presumed, will now be done. At a private meeting of the coalowners, which was held after the conference, the following decision was come to: "In view of the position taken up to-day by the miners' delegates, the coalowners are willing to open their pits at a reduction of 15 per cent.—such amount of 15 per cent. to be paid into a bank to the credit of the coalowners and of someone nominated by the men, such sum to remain in the bank until a final settlement of the dispute. When such settlement is come to, the money in the bank to be then paid in accordance with the decision arrived at at such settlement." The miners' representatives also held a separate meeting, at which the following resolutions were adopted: "That the employers' offer to have the present dispute settled by arbitration be placed before the men. That this conference regrets that no settlement has been arrived at by the joint conference to-day, seeing that such great interests are at stake. We are confident that, had the employers been as conciliatory as the men's representatives, this disastrous conflict would have terminated; and the responsibility must rest on the employers for its continuance." At a special meeting of London coal merchants held at the Midland Hotel, St. Pancras, it was decided to make a reduction of 4s. per ton on kitchen coal, and 2s. per ton on cobbles and nuts on Monday. A conference of northern coalowners and representatives of the miners was held in Newcastle, to consider an application for an increase in wages. The owners offered to advance 5 per cent. for three months; and this was accepted by the men's representatives. Work was resumed at several collieries in the Wrexham, Duckley, Ruabon, and Chirk districts; and it was expected that there would be a general resumption in a few days.

In the JOURNAL last week, reference was made to the statement of Mr. Alderman Lennard, Chairman of the Gas Committee of the Leicester Corporation, at the meeting of the Town Council on the 23rd ult., that the Committee intended approaching their coal contractors with the view of obtaining some compensation for the additional expense incurred in connection with the supply of coal to the gas-works owing to the dispute in the coal trade. As the contracts do not contain any allusion to a "lock-out," the Committee held that the contractors were bound to make delivery, notwithstanding the stoppage of their pits. On calling upon the contractors to do this, however, they took Counsel's opinion, and came to an opposite conclusion. Friendly negotiations were then tried; and the result has been that the contractors have decided to make such a concession as will enable the Committee not only to abandon the idea of advancing the price of gas, as they proposed doing, but to hand over to the Corporation the handsome net profit promised some months ago.

The scarcity of coal is producing some curious, as well as many lamentable, effects. Last week we recorded the fact that the Chairman of the Burnley Gas Committee congratulated the Corporation on the decreased consumption of gas. At Middleton lately, Mr. Lord, the Chairman of the Gas Committee, made an equally unusual observation. He told the members of the Town Council that the Committee were buying coal at twice the contract rates, which meant an increase of 1s. per 1000 cubic feet on the ordinary price of gas. It was therefore, he added, requisite that the strictest economy should be exercised by the consumers.

AN EXTRAORDINARY GAS EXPLOSION IN BELFAST.

During the evening of last Sunday week, a gas explosion occurred in Belfast of a character so extensive that a large portion of the city was for several hours in almost complete darkness. The scene of the occurrence was the Falls Road, where some sewerage work was being carried out. The road had been opened for some distance; and, in consequence of the heavy rain on the day mentioned, a portion of the excavation, it seems, fell in, carrying away about 20 feet of the gas-main. Unfortunately, the accident was not noticed until a man (whose name has not been ascertained) was observed to walk over to the sewer, stoop down, and heedlessly strike a match. Almost simultaneously with the appearance of the light, the district was startled by a terrific explosion; and it was at once seen that the gas-main was on fire. Two huge tongues of flame darted into the air; and the heat was intense. Information was at once telephoned to the gas-works and the fire-brigade station; and Mr. J. Stelfox, the Engineer of the gas-works, and Superintendent Parker, with a number of men, were promptly on the spot. Before any satisfactory progress in extinguishing the conflagration was made, the gas supply of the city had to be considerably reduced. The effect of this was that, with the exception of one or two of the principal streets, a large portion of the city was in darkness—at least so far as artificial light was concerned—and the services in the churches had to be somewhat curtailed. It was not long after there was a perceptible diminution in the pressure that the efforts of the workmen to extinguish the flames were successful; but this was not accomplished without considerable danger and risk—the method adopted being the shovelling of wet earth upon and into the pipe. In this way the lower opening was closed; but different measures had to be devised to effectually deal with the other escape. The withdrawal of the supply from the gas-works did not affect it; the flames being fed by the gas which had passed up the main to a higher level, and was returning to the opening created by the fracture of the pipe. Mr. Stelfox decided that the only way to deal with it was to cut the main about 30 yards above this outlet. This operation was safely accomplished; the opening was plugged; and shortly afterwards the flames, which had been considerably reduced in volume, were altogether extinguished. About half-past ten o'clock, all danger was over; and shortly afterwards the city was supplied with gas again. It is a matter of considerable satisfaction to all concerned that the occurrence was not attended with any serious injury to life or property; but the value of the gas consumed must have been very considerable.

THE AMALGAMATION OF WATER-GAS COMPANIES.

Extraordinary meetings of the Lancashire and Yorkshire Water-Gas Company and of the British Water-Gas Syndicate were held at Leeds last Tuesday, for the purpose of considering motions in favour of winding up the concerns, and appointing Liquidators. At the meeting of the first-named Company, on the resolution being put, seven shareholders voted in opposition; but the Chairman (Mr. J. Mitchell) said that, as none of them had paid their calls, he must declare the resolution carried unanimously. At the British Water-Gas Syndicate meeting, the Chairman (Mr. Samson Fox) stated that the new Company binding the three Companies together had been registered, all documents had been completed, money had been paid by both the Subsidiary Companies over to the Amalgamated Company's account, and they had only now to dissolve the North British and Lancashire Companies and their own Syndicate. After he had moved the resolution, Mr. Leah rose to propose an amendment, but was informed that it would be out of order. Mr. Leah insisted upon his right to speak, and was supported by Mr. Brook, whose strong language was objected to by several gentlemen present. Mr. Leah, in the course of his remarks, stated that the total capital paid into the Syndicate and two subsidiary Companies was £512,000, in addition to £15,000 paid by the Notts and Derby Water-Gas Company, making a round total of £527,000 in hard cash. Notwithstanding this enormous capital, he declared the Syndicate were indebted to one bank for £352, and to another for £4561; making £4913. It was a little over four years since the Syndicate was formed, and one bonus of 5 per cent. had been returned to the shareholders. During that period, he asserted, not a single farthing of profit could be found in the business; and attempts on the part of shareholders and requests to have an investigation of these matters had, he insisted, been roughly, if not illegally, rejected by use of shares for voting which were not owned by the Directors any more than by any other individual in the Company. They had been told that water-gas in Britain and elsewhere was a commercial success; but he challenged and defied the Chairman or his colleagues to prove that any single firm used it with profit or commercial success. Believing this, he had commenced an action to have matters decided by the Court. On the resolution being put, the Chairman declared it carried by "more than three to one."

THE MANAGEMENT OF THE KEIGHLEY CORPORATION GAS-WORKS.

An Inquiry into Allegations made by the Late Foreman.

Early in the present year, there was, as reported in the JOURNAL at the time, some trouble with the men employed at the Keighley Corporation Gas-Works—partly arising out of the discharge of a foreman named Hall. At the April meeting of the Town Council, certain questions relating to the matter were put to the Gas Manager (Mr. John Laycock); and, in the course of his replies, he is reported to have said that, "though since the strike they had not used an ounce of cannel coal, which had been regularly used last winter, they were now getting more gas, and that of a superior quality." Following this meeting, a letter appeared in the *Keighley News*, signed by John Hall, in which he declared that he was prepared to prove that since the strike "scores" of tons of cannel had been used, and alleging that it was the excessive use of this coal, coupled with the stoppage of the stoking-machines, that had produced the difference in the quality of the gas. He further offered, if the Gas Committee would give him the opportunity, to show them machines on the works which were employed for pumping air into the gas, and of the existence of which they were not aware; and also how, without these machines, air could be, and was during last winter, passed into the gas, in order to make up for the deficiency caused by the use of the stoking-machines. In consequence of this, Mr. Laycock commenced an action for libel against Hall; but afterwards the parties agreed to refer the matter to arbitration—Mr. J. WAUGH, C.E., of Bradford, being appointed Arbitrator. The proceedings took place last Friday week, in the Municipal Offices, at Keighley, when Mr. Laycock was represented by Mr. W. A. ROBINSON; and Mr. Hall, by Mr. J. WALSHAW.

Mr. WALSHAW, in opening the case, pointed out that the issues were practically three—(1) That large quantities of cannel had been used; (2) that certain machines had been used for passing air into the gas; and (3) that air had been taken into the gas even without the use of the machines. Speaking specially as to the admission of air into the gas, he said that perhaps it was difficult to keep it out; but he thought he could show that there had not been the careful management necessary in this respect. He had taken the opportunity of looking over other gas-works besides those at Keighley. He was informed that the result, if the engine used for exhausting the gas from the retorts was speeded, must be to draw air from somewhere. It was usual, he believed, to work at ½-inch pressure; but when he was inspecting the Keighley works, they were actually working at 3-inch pressure. His client would say that he had constantly found the governor of the engine weighted, with the result that the vacuum was increased, and air drawn in, particularly when the lids of the mouthpieces were open for charging. The Manager himself had weighted the governor; and the foreman had a right to assume that his object in speeding the engine was to get air into the gas.

Before evidence was taken, the Arbitrator visited the gas-works. On the resumption of the proceedings,

Mr. *Hall* was first examined. He stated that, when his engagement terminated on March 25 last, he had been foreman at the works for about nine years. At the time he left, there were about 140 or 150 tons of cannel in stock. One of the machines for passing air into the gas was purchased either in 1889 or 1890; and this was used by him for perhaps twelve months. A second machine was used for two years; but neither of the machines was employed last winter. These machines were attached to the mains; and, when first used, Mr. Laycock said to him: "You must not let anyone know, or there will be a row in the town." The second machine was procured to replace the first; and he passed more air through it than the other. In the height of winter, the average for weeks together was about 16,000 or 17,000 cubic feet of air daily, or £2 worth. The depth of the seal varied from 1 inch to 1¾ inches; and the ordinary pressure of the vacuum was 1½ inches and 1¾ inches up to 2 inches. The governor was weighted many times by Mr. Laycock unknown to witness; and he had complained to him about it. The result of the weighting of the governor was that, when the men were drawing, they could often hear the roaring of the air which was being drawn into the mouth of the retort through the seal.

In cross-examination, witness said he did not remember that the two machines or meters were obtained so early as 1886 or 1887. It was his duty to see that there were no leakages into which air could be drawn, and to alter the seal if it allowed air to pass. He did not know that during last winter a tin pipe which supplied the hydraulic main with water was broken. The new stoking-machines knocked the joints out of the retorts; and thus gas was allowed to escape from the retorts up the chimney, and, in order to make up the deficiency, Mr. Laycock was continually weighting the governor of the engine so as to draw in air. He should not have exposed the practice had not Mr. Laycock made his statement at the Council meeting.

Several men who had been employed at the works, but were discharged a few weeks after the strike, were called. They agreed that the stoking-machines were worked four or five days after the strike, and that, when hand stoking was resumed, both cannel and ordinary coal were carbonized.

Mr. ROBINSON then submitted that there never was a series of serious charges made against a public servant in a newspaper that had been attempted to be justified by such slender evidence as in this case. The defendant had not proved his assertion that "scores" of tons of cannel had been used, and had not attempted to prove that the excessive use of cannel, coupled with the stoppage of the stoking-machines, had made the difference in quality. In his letter, Mr. Hall insinuated that meters had been used for the purpose of pumping air into the mains, and that the Committee were not aware they were being used; but evidence was not brought on this point. As a matter of fact, the meters were ordered by the Committee. Any air passed into the gas had been through the negligence of the foreman himself; and he would prove that a certain pipe had been broken and patched up with clay. but this was not found out until there had been a breakdown in the gas supply some time afterwards. The cause of this breakdown was the drawing in of air through the broken pipe. With reference to the employment of cannel, the last lot which came into the works was one waggon on March 13, and two waggons on March 17; and these were used up by the stoking-machines, and the empty waggons sent back on March 24. The last record of the stock made by Hall was on Feb. 10; and a clerk took stock on March 10, when there were about 14 tons of cannel on the works. Not another ounce of cannel was received until Sept. 18. On April 18, the men bared a small heap of cannel which had been covered up; and part of it was used at the latter end of April. The Committee stopped the use of the meters to supply air for purifying purposes because of reports being circulated in the town that air was being forced into the mains, in order that there might be no ground for suspicion, although it entailed a greater cost for purification when this system was suspended.

George Haynes, the night foreman at the works, deposed that, at the time of the strike, there were not more than 3½ or 4 tons of cannel in the retort-house; and there was only about 2½ tons used up to April 25.

Mr. *J. Laycock*, the Manager, was then called. According to his statement, there were about 14 tons of cannel stacked at the time of the strike; and none was received between March 17 and Sept. 18. From March 28 to April 18, he exercised a general supervision over the works; and during that time he did not see any cannel used. It was not true that air had been pumped into the gas to increase the receipts, or drawn into the gas, unless by accident. The Committee ordered the meters which had been referred to in November, 1886. Their purpose was to furnish air to purify and revivify the oxide in the purifiers; and they had saved by this system £700 in wages alone. They drew about 1½ per cent. of air through the meter; but this would not make any difference in the price of gas, nor could they distinguish any difference in its illuminating power. Their gas production was, at the time in question, about a million cubic feet per day. The use of the meters was stopped on Jan. 16, 1891. No apparatus was used during last winter for passing air into the gas; and he had made every possible effort to keep it out. The testing records showed that on certain occasions in February, March, and April, air did get into the gas; and that the illuminating power fell from 18 to 14½ candles. No special reason was discovered to account for this until April 14, when it was found that a pipe which supplied the hydraulic main with water was broken, and air was being drawn in. If the seals were properly attended to by the foreman, no air would pass, even when the lids of the retorts were off. Hall had never complained to him about the engine pressure, but he had complained to him about taking off the weights. It was a dangerous thing when the air "roared" in the mouths of the retorts, and then it was the duty of the foreman to remedy this.

Mr. *T. Newbigging*, of Manchester, was next examined. He said he had never known of a gas manager forcing or drawing air into the gasholders or any portion of the apparatus for the purpose of increasing the receipts or making up a deficiency. The charge was frequently made; but the thing would be absurd. The effect of mixing air with coal gas to the extent of 5 per cent. would be to destroy 33 per cent of the illuminating power; 15 per cent. of air would reduce the illuminating power 80 per cent.; while 40 per cent. of air would totally destroy the illuminating power. The system of revivifying the oxide by means of air prevailed very generally; and he had no doubt that the complaints of pumping in air had arisen from this circumstance becoming known. The use of 1½ per cent. was not deleterious to the gas. He admitted, however, that probably there would be a deficiency in the production of gas where stoking-machines were not well worked; and at Keighley they could not be operated with advantage, as the working space was too limited.

Henry James, the present foreman at the works, stated that after the broken pipe referred to had been plugged, the illuminating power of the gas rose from 16 to 17½ candles in less than an hour.

Other evidence corroborating that given by Mr. Laycock was adduced; and at the close of the proceedings (which had lasted 8½ hours), the Arbitrator announced that he should defer his decision.

THE MANAGEMENT OF THE STOKE GAS-WORKS.

Among the candidates who have been seeking re-election to the Stoke Town Council is Mr. F. Geen, who, during the past year, has been Vice-Chairman of the Gas Committee. A meeting in support of his candidature was held yesterday week; and, in addressing the electors, he devoted the greater part of his speech to the gas-works and their management—a question which, in his opinion, stood head and shoulders in front of all others. The management of the works had, he said, been a subject of seething discontent, because they had hitherto been conducted by a secret Committee. When the scheme for new gas-works was being pushed forward, it was asserted that, in two years from that time, the existing works would not be adequate for supplying half the town with gas. Time, however, had proved the fallacy of the argument. The present Gas Committee had carefully checked all the Manager's figures; and he believed it was the adoption of this course which defeated the scheme when it came before them. If the new works had been proceeded with, it would have meant a heavy addition to the burdens of the ratepayers. He contended that the profits made from the undertaking in the past ought to have been much greater. In spite of what had been said to the contrary, the increased profit of the quarter ending March last was close upon £600, as compared with the corresponding period of the preceding year; and there was no reason why much larger profits should not be made. They had a complete monopoly of the supply of gas, and could put their own price on it. It had been stated by Alderman Boulton that the accounts for the quarter ending June 30 last showed a loss of £200, as compared with the same period of last year. This could, however, be easily explained. Over and above what was expended in the June quarter of 1892, £182 was spent in repairs and in maintaining the works; the price of tar had dropped from 28s. to 14s. 6d., and they received £90 less on that account; and there was also a reduction in respect of coke, which to him was incomprehensible,

of £77 odd. But for these very exceptional circumstances, they would have made an additional profit of £100 compared with the previous year. Mr. Geen next dealt with the question of the coke produced from the coal carbonized. He said that for some reason the amount of coke which they should have had for sale had not been available; and if he was re-elected, he should make it his duty to still further look into the matter. The reply of the Manager to a question which he (the speaker) put to him at a meeting of the Committee, as to whether he could explain how the deficit arose, was that he thought the Sub-Committee were so very diligent that they could find it out for themselves. The Committee ought not to receive from any official an answer of that kind; and if they could not get different treatment to that, the result sooner or later would be disastrous. Mr. Geen then proceeded to refer at length to the question of the selection of a tender for the supply of coal for twelve months in February last; and he complained that forms of tender were not available for all who applied for them, because of an alleged mistake on the part of the Manager. Instead of buying coal from a middleman, as they had been in the habit of doing, they should, he held, trade direct with the colliery proprietors, situated as they were practically on the pit bank. As a business man, he should, all other things being equal, accept the lowest tender; and in this case the lowest was that of Messrs. Rigby and Co., whose price was 7s. 9d. per ton, or 1s. 7d. per ton less than that of the middleman who had been supplying the coal hitherto. The Committee hesitated to accept the lowest tender, and decided to order five boatloads of the coal—the Manager having reported that a test proved it to yield only 8600 cubic feet of gas per ton, or 1000 feet less than that previously produced. The Committee found that the retorts employed in the test were the oldest and most dilapidated they had; and this, he considered, was not a fair trial. The coal was used years ago at the gas-works; and, after some difficulty, he got from the Manager the results of previous tests made of it, from which he learnt that in October, 1881, a test of exactly similar coal resulted in a production of 10,086 feet per ton. Proceeding to give proof of the good quality of the coal, Mr. Geen said it was used in the first year of the Joint Committee, and produced an average of 9600 cubic feet per ton. This was not so satisfactory as they had a right to expect; and therefore they asked Messrs. Rigby and Co. for an explanation. They then produced letters, showing that the coal had furnished excellent results in other places—including Birmingham, Burslem, and Fenton. In conclusion, Mr. Geen said they had no desire to do anything prejudicial to the members of Mr. Taplay's family; but they were determined to make the Manager directly responsible to the Committee for the working of the concern.

LEEDS CORPORATION GAS AND WATER SUPPLY.

The Municipal Elections and the Finances of the Departments.

The municipal elections at Leeds have been contested almost entirely on party lines; and the consequence is that the Conservatives, in their speeches, have freely charged the Liberals (who have predominated in the Council) with maladministration, while, on the other hand, the Liberal candidates have been equally severe in their statements concerning their opponents. As might be expected, the Gas and Water Departments have been the subjects of much criticism; and, with the view of setting things right before the ratepayers, the *Leeds Mercury* has devoted several articles to matters relating to the two undertakings. From these we have extracted the most interesting portions.

Taking first the Gas Department, our contemporary shows that a gross profit was made in the year ending March 25 last of £13,259, after meeting interest charges of £42,576; and that, after carrying £10,118 to the fund for the redemption of debt, they had a net surplus of £3141. At the end of the financial year, the total capital of the gas undertaking was £1,171,755. Out of the profits made year by year, there has been paid into the sinking fund £225,560 for the redemption of the capital; and prior to 1886, there was paid into the city fund £69,834 out of the profits. But this amount had been reduced by one or two unsuccessful years to £42,325; and this was the net amount from the Gas Committee's surpluses applied in the relief of rates up to the commencement of the financial year 1886. "Up to a recent period, then," proceeds our contemporary, "the gas-works had not only paid their way, but contributed handsomely to the relief of the rates. Bad times then smote heavily upon this manufacturing concern, as they do upon others. The residuals—tar and ammoniacal liquor—which had yielded in the two years 1884 and 1885 no less than £103,755, fell suddenly, and so low in price, that the deficiency in yield for the next two years was, upon the basis of coal consumed, no less than £73,612. What marvel then that at the end of 1887 the accounts showed a revenue deficiency for the two-and-a-half years of £36,000! The Committee might, of course, have raised the price in proportion, and have shown a profit on their production. But in the hope of a recovery in the prices of the residuals from a fall so sudden, they refrained from imposing that burden on the consumers; and it is to the credit of their management that the deficiency on the working for those two-and-a-half years was not much greater than it was. The net deficiency at that date, through a transfer from the reserve, &c., fund, stood at £30,976. When the year 1887 had run its course, the times improved. It may be noted that it was about this period the Council determined to alter the date up to which the balance-sheet should be prepared; and consequently the next financial 'year' was one of fifteen months. During these fifteen months, the gas undertaking produced a profit of £6421, which brought down the deficiency to £24,554. Up to March, 1890, another profit of £5423 was made. This still further reduced the adverse balance to £19,131. Presently, however, the Committee again entered upon troublous times. When the coal contracts came to be let at Midsummer, 1890, the boom in trade had sent up the price at least 2s. a ton. Then followed the welcome increase in wages at the gas-works; and this amounted in the aggregate to £14,000 per annum. For six months those increased charges had to be borne by the Gas Committee, who had continued to supply gas to the consumers at the old rate of 1s. 10d. per 1000 cubic feet. Obviously an advance in price was now necessary; and it was made by the Council at the earliest opportunity. In the meantime the gas-works had, of course, been carried on at a loss. At the end of the next financial year, there was a deficiency of £14,728; bringing the total from 1886 up to £33,859. Matters then righted themselves; and, notwithstanding increased charges for coal, a profit of £3141 was made in 1893, reducing the total indebtedness to £30,718." But the writer subsequently points out that, if the whole period covered by his article is taken, instead of the management of the Committee having ended in a deficit of £30,000, there is a net balance of £11,609 in their favour; and, "after all, this sum of £30,000, accrued over several years, represents only six weeks' average income from the sale of gas alone," which can "therefore be easily dealt with whenever the Committee think fit to do so." Further evidence is given "of the efficiency with which the gas-works are conducted" in a comparison between the state of things in 1871—just after the concerns were purchased from the Companies—and in 1891. In 1871, the quantity of gas made was 888 million cubic feet. Of this 688 millions were sold; the leakage being 200 million feet, or 22·5 per cent. In that year, again, the yield of gas per ton of coal carbonized was 9025 feet. Coming to 1891, we find the quantity of gas made was 2412 million feet; and the quantity sold was 2103 millions. There was thus a leakage of 309 million feet, or a percentage of 12·83—a considerable saving on 1871. In 1891 each ton of coal carbonized yielded 10,029 feet of gas. In another article, our contemporary deals with the question of gas-meter rents, the abolition of which it advocates. It says that the effect of such a step will be to benefit the small consumer; and though the large consumer may suffer to some slight extent in the process, the system which it is suggested to substitute for the existing one will place all consumers alike on a footing of perfect equality. Each consumer will then be charged at an uniform rate for the gas he consumes; and this will be all he will be called upon to pay. As an argument in favour of the proposal, it is pointed out that there are 46 towns in the United Kingdom where meter-rents are not charged; and the system is spoken of as working very well. The Corporation, it is also mentioned, are now receiving £10,000 a year in the shape of meter-rents; and, of course, the only way in which they could recoup themselves, if the rents were abolished, would be by raising the price of gas (it is estimated) by 2d. per 1000 cubic feet.

There has not been so much information published with regard to the water-works; but from what has appeared, we have gathered the following particulars: The cost of the water-works is set down in the city accounts at £1,696,875. The revenue from water-rents, &c., during the year ending March 25 last was £102,828; and, after meeting the expenditure on maintenance and all working charges (£21,651), a gross profit of £81,177 remained. Deducting the interest on loans (£58,366), gave a surplus of £22,811, from which £16,460 was carried to the sinking fund for the redemption of the debt—thus leaving a net profit of £6351.

A Protest against the Increase in the Price of Gas at Derby.—It is reported that, on account of the Derby Gas Company having raised the price of gas 3d. per 1000 cubic feet, no less than 800 meters have been cut off at the request of private consumers, who are substituting oil-lamps in place of gas.

The Water Supply of Newcastle.—It was stated at the last meeting of the Newcastle City Council that the Gas and Water Committee, in view of the Water Company going to Parliament next session for further powers, had retained the services of Mr. J. Mansergh, and had requested him to report upon the whole subject of the water supply of the city and district.

The Halifax Corporation and Local and Outside Contractors.—In the JOURNAL for the 24th ult., a paragraph appeared on the above subject. The matter had special reference to the Gas Committee's contract for retorts, which the Corporation were recommended to place with an outside firm, on the ground that "the same quality of retorts could not be obtained in Halifax as elsewhere." It appears that in the course of the discussion on the question at the Council meeting, a statement was made to the effect that retorts of Leeds make would last twice as long as those of Halifax make. This called forth a collective reply to a local paper by the tendering firms in the Halifax neighbourhood, who gave the assertion unqualified denial. They very pertinently ask why they were invited to tender if, as it would appear, the gas authorities were decided in their own minds that the Leeds retorts were all that could be desired. In a letter addressed to us on the subject, they say that had the Committee, who stipulated in the form of tender that references should be furnished, made inquiries from the gas-works to which such references were given, they would have received ample evidence that the very opposite of the statement as to the durability of the retorts was the fact.

Wilful Damage to Public Lamps.—A writer in the *Globe* last week called attention to the propensity of the boy of the period for damaging public lamps. He pointed out that there is not a town in the kingdom the ratepayers of which have not to pay heavily for this juvenile amusement; and, inasmuch as detection is extremely difficult, he thought punishment should, in the event of a capture, be of a sufficiently severe kind to act as a deterrent. According to this writer, there is no legal remedy. If the delinquent is fined, his parents have to pay; and, of course, this fact does not cause him any uneasiness. It appears that in the Midlands, a few days ago, two urchins aged nine were proved to have smashed nineteen lamps in succession on one occasion only; thereby saddling the ratepayers with the disbursement of a guinea and a half. The parents, on being called upon to make good this loss, pleaded impecuniosity; and the Stipendiary could not do anything more than consign the little rascals to the workhouse for a week, pending the result of inquiries by the School Board inspector. Thus, the people punished were the ratepayers. "What," asked the writer, "would a father do if his mischievous son wilfully destroyed the household lamps? Paterfamilias would assuredly arise in his wrath and castigate that erring lad with considerable severity. Why, then, should the law be more tender-hearted?"

ADDITIONAL WATER-WORKS FOR LEICESTER.

At the Meeting of the Leicester Town Council yesterday week, the Water Committee recommended that application be made to the Local Government Board for a Provisional Order, amending the Local Act of 1890, so as to enable the construction of a water service reservoir at Hall Gates (adjoining Bradgate Park), in lieu of the additional service reservoir authorized by this Act to be constructed at New Parks. The proposed new service reservoir would, they said, be at such a level as to supply the water to the high-level reservoir at Oadby by gravitation, and the Charnwood Street pumping-station would be abolished. The suggested alteration of the site of the new service reservoir would necessitate considerable variations in the line of, and additions to, the main pipes authorized by the Act of 1890; and the Committee recommended that authority to make these substitutions and additions be also, as far as necessary, included in the proposed Order. The estimated additional cost of these variations of the scheme was £24,000, for the borrowing of which the Committee recommended that power should be included in the Order. The Committee also reported that they had arranged to purchase 5 acres of land at Hall Gates as a site for the intended reservoir; the price agreed upon being £1000. In moving the adoption of the report, Alderman Wood stated that the proposals of the Committee would put the town in a perfectly safe position; but they all meant money. The cost of the site would be £1000. They would have to compensate the tenant, and pay for the timber; and they estimated that this might cost them £2000. The construction of the service reservoir on the top of the Hall Gates Hill would cost £12,000; and the expenditure on extra mains, valves, and labour would bring the total outlay up to £50,800. But then, on the other hand, they would have some large credits. Altogether it was estimated they would save £26,000; leaving the additional cost to the town for this alteration about £24,000. But this would not be all loss. He would point out that, if they had to give an adequate supply of water under the Act of 1890 to the high-level districts, they would have to double, if not treble, their pumping power at Charnwood Street. Instead of spending £600 a year there as at present, they estimated they would probably have to spend £1500 a year; whereas, under this new scheme, they would save the entire cost of pumping at Charnwood Street. This meant a saving of probably £1500 a year, which would go towards the payment of the interest on the £24,000. Mr. Coleman seconded the motion, which was supported by several members, and ultimately carried.

AUXILIARY WATER SUPPLIES FOR DUBLIN.

A Special Meeting of the Dublin Municipal Counci was held yesterday week, to consider a letter from the Secretary of the Water Committee (Mr. J. J. Lalor), as to obtaining a supply of water from the Royal Canal. The letter related the steps which had been taken to furnish the city with water during the long-continued drought, and then proceeded to point out that the contingency of a still longer drought had to be provided against, to meet which the Water Committee had arranged with the Midland Railway Company to take a supply from the eighth lock, or other level, of the Royal Canal, to carry it in pipes along the canal bank, and empty it direct into the city mains. The expenditure, it was pointed out, would not be wasted, as the pipes might either be allowed to remain, and be used for supplying water for trade purposes, or, if they were taken up, the only expense would be the cost for laying and removing them. The Railway Company had agreed to supply the water at a charge of ½d. per 1000 gallons. The necessary pipes had already been ordered; and the Committee asked that they should be given the necessary powers to raise the sum of £4500 immediately, and, if requisite, a further £2000. The letter further stated that the Committee had been in negotiation with the Rathmines Commissioners for the purchase of their disused works at Gallonstown, on the eighth lock level of the Grand Canal. When the Committee were obliged to restrict the supply of the Vartry water, the Commissioners offered the use of these works temporarily, on the understanding that the arrangements for purchase, provisionally entered into, would be carried out. The Committee took over the works, made some requisite repairs at the filter-beds, and the necessary connections required to introduce the water into the city mains; and they have found this satisfactory. The sum agreed to be paid was £4500. In a report which was appended to the letter, the City Engineer (Mr. Spencer Harty) described the Gallonstown works. He said that they consisted of six filter-beds, three of which varied from 70 ft. long by 40 ft. wide to 55 ft. long by 40 ft. wide, and three others, each of which was 66 ft. by 40 ft.; the depth of the filtering material being only 3 ft.—thus securing rapid filtration. The water from these filters passed into two covered reservoirs or pure water-tanks; one being 140 ft. long by 70 ft. wide, the other being L-shaped, and 108 ft. 9 in. long by 47 ft. 6 in. wide at one end, and 55 ft. at the other. Both contained when full 663,000 gallons; the water being 6 ft. 6 in. deep. The entire works were surrounded by a stone wall, enclosing an area of 8872 square yards. From these works a 15-inch main passed under and along the canal for a distance of about 2¼ miles; having all the necessary valves and connections. From thence it was reduced to 12-inch and 9-inch pipes to the township boundary, at which point it was proposed to connect the Corporation mains. The level of the water at the eighth lock was about 33 feet higher than that of the Corporation works at the fifth lock. He believed the original cost of the works proposed to be purchased was between £11,000 and £12,000. They were well built, and were constructed under the supervision of Sir Frederick Bateman. The letter and report having been submitted, the Chairman (Mr. J. A. Walker) moved a resolution authorizing the Committee to raise a sum of £6500 for the purpose of procuring a supply of water from the Royal Canal. In a speech of considerable length, he described the difficulties the Committee had had to contend with during the drought, and the steps they had taken to maintain a supply in the city and out-townships. The resolution was seconded by Alderman Dillon, who replied to some of the criticisms which have been so unsparingly poured on the Committee in the local press. The resolution was unanimously adopted; and another was afterwards passed giving the Committee authority to conclude the purchase of the Gallonstown works, and to raise £4500 for the purpose. It was mentioned by Alderman Dillon, in connection with the latter resolution, that the Committee were only taking the powers lest they should be required. It might be that an arrangement which they had in progress with the brewers and distillers would render it unnecessary to ask for the money. The brewers had made a proposition to buy the Gallonstown works, and hand them over to the city, if the Corporation would lay pipes from the city boundary to the different breweries and distilleries, so as to give them an additional supply of water. This matter was now in negotiation, as was also a negotiation with the Grand Canal Company with reference to the terms on which the supply could be obtained. The Committee, however, wanted to have the money available in case they wished to close the bargain.

CAPE TOWN DISTRICT WATER COMPANY, LIMITED.

The Fifth Annual Meeting of this Company was held last Thursday, at Winchester House, Old Broad Street, E.C.—Mr. J. S. PRINCE in the chair.

The notice convening the meeting having been read,

The CHAIRMAN moved the adoption of the report and accounts. He said these showed that the interests of the shareholders had been well cared for during the twelve months, and that the property was in a sound and improving condition. At their last meeting, he informed them that their Local Board had estimated the income for the year at £6500; whereas it had been £7499. The Local Board, with their usual caution, had estimated the revenue for the current year at £8250; but he quite believed that this, as on former occasions, would be exceeded. This indicated that, with an increasing revenue such as they had, the undertaking could not fail to be a very prosperous and remunerative one. The gross revenue of £7499 was an advance of £2000 upon the preceding year; but the actual increase in the revenue derived from water was £1398. The quantity of water now supplied daily to the private consumers was 143,000 gallons; but this was in addition to the supplies to the Municipality of Woodstock and the Government Railway Department, which, he believed, amounted to 300,000 gallons per day. The quantity of water yielded by the springs continued satisfactory; and, with regard to the houses served, the number during the year ending June 30, 1892, was 832, while in the past twelve months it was 1206. This was an increase of 374 houses, of which 163 were newly-erected ones. In the course of the year, 4711 yards of new mains had been laid, involving an expenditure of £1308; and a large number of pipes were now being shipped, to meet the fresh applications which continued to come in almost daily. Reverting to the accounts, he said the profit was £508; but the amount was somewhat reduced by the adverse balance of the previous year, and by extraordinary expenses connected with the issue of debentures. However, he quite expected that the profit which would accrue during the current year would enable the Directors to declare the first dividend upon the ordinary share capital. Having mentioned that the engagement with their Engineer had expired, and that the Board had appointed to the position Mr. Bennett, who was for eight years Manager of the Cheshunt Water-Works, he concluded by expressing the regret of the Board at the death of their colleague, Mr. Charles Crew.

Mr. J. H. DURHAM seconded the motion, which, after a few inquiries had been answered, was unanimously carried.

Mr. H. E. M. Davies, who retired from the Board by rotation, and the Auditors (Messrs. Deloitte, Dever, Griffiths, and Co.), were then re-elected; and subsequently the services of the Directors were suitably acknowledged.

Georgetown (British Guiana) Gas Company, Limited.—The half-yearly meeting of this Company was held last Tuesday, at the London Offices, No. 30, Gracechurch Street, E.C. The Chairman (Mr. Alfred Williams) said he did not think it necessary to go through the accounts, as they were so explicit; and he therefore simply moved the adoption of the Directors' report, the chief portions of which were noticed in the JOURNAL for the 24th ult. The motion was seconded by Mr. C. Gandon, and unanimously carried. It was also agreed, on the proposition of the Chairman, seconded by Mr. Robert Berridge, that dividends be paid for the past six months at the rates per annum of 8 per cent. on the preference shares and 6 per cent. on the ordinary shares, both less income-tax (except upon those dividends payable to the local shareholders). Resolutions were afterwards passed thanking the Secretary (Mr. S. Woods), the local Secretary (Mr. F. A. Conyers), the Engineer (Mr. T. B. Younger), the Auditors (Messrs. Magnus Ohren and J. Manwaring), the Solicitor (Mr. E. K. Blyth), and the Chairman and Directors for their attention to the Company's business during the half year.

Gas and Electric Lighting Affairs at Salford.—At the final meeting for the past municipal year of the Salford Town Council held yesterday week, it was reported by the Gas Committee that the Local Government Board had granted their permission to the borrowing of a further sum of £30,000, making a total of £90,000 now sanctioned towards the sum of £120,000 authorized for the purpose of extending the gas-works. It was further stated that the Board had also sanctioned the borrowing of the sum of £32,000 for electric lighting, repayable within 25 years. The amount which the Council sought power to borrow for the purpose was £50,000. Subsequently, in reply to Mr. Thompson, the Chairman of the Gas Committee (Mr. Holland) said the time was not quite opportune for him to pledge the Gas Committee to abolish the deposits charged to consumers—firstly, because he might not reappear in that Council after that meeting; secondly, because the Gas Committee had already lost several thousands of pounds of revenue by the abolition of meter-rents; and, thirdly, because, owing to the enormous price they were paying for coal, they had "overrun the constable" to the extent of about £7000. He therefore thought the question of deposits had better stand over for consideration at a more favourable time.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I confess to a feeling of almost sorrow, at an announcement by Lord Provost Russell, of Edinburgh, at the meeting, on Monday, of the Edinburgh and Leith Gas Commission. It was the last meeting before the municipal elections, when the Commission will be to some extent reconstructed; and his Lordship announced that, besides those who might not be re-elected, there would be further changes, because two members had resigned. In the Corporation of Edinburgh, he said, a kind of resolution had been come to, in order to maintain a sort of *esprit de corps*, or friendly rivalry, that the electric lighting and the gas departments should be kept separate; and those of the Gas Commissioners who were to take part in the work of the Electric Lighting Committee, were retiring from the Commission. One of these was Bailie Dunlop. Now it is a little unkind of Bailie Dunlop to thus turn a cold shoulder to the Gas Commission; for he is, next to Mr. Colston, the person who is most responsible for the Gas Commission being in existence. It is true that the absence or presence of one individual will not mar or make a Commission; but decency might have dictated to Bailie Dunlop, whatever his private opinions may be, the expediency of his remaining with the Gas Commission to give it all the help he can. In Glasgow, Dundee, and Aberdeen the same men who manage the gas undertakings also manage the electric lighting; and no harm results to either. In Edinburgh it is a little different, because Leith is associated in the Gas Commission; but that need not have required separation. It is a pity that, on any ground, the best men in the Corporation should be lost to the gas-lighting interest.

The Commission went through a large amount of business. They resolved to take no action in the meantime in the matter of making water gas. The subject of supplying at a reduced price gas for driving gas-engines was, in the first instance, settled by their adopting the recommendation of the Works Committee to decline to give reduced terms to Messrs. Brown Bros., of the Rosebank Iron-Works, who had applied for it; but later on it was re-opened, by the adoption of a motion by Bailie Walcot to send to the Committee to consider as to the best means of encouraging the use of gas for power purposes.

But the two most important items of business before the Commissioners had reference to the adoption of automatic prepayment meters and the extension of the Leith works. On both subjects, Mr. F. T. C. Linton, the Engineer of the Leith works, had prepared elaborate reports. I have procured copies of these; and as you will probably consider them worthy of being summarized for the news columns of the JOURNAL, I will only briefly refer to them here. In his report on automatic meters, Mr. Linton pointed out that in Edinburgh and Leith, as in Glasgow, a higher point of saturation with gas-lighting has been reached than is the case in English towns; and that therefore little new business would be got by adopting these meters. He pointed out, however, that they would be regarded as a great boon by small consumers, who have to leave a money deposit before getting a supply of gas. He estimated that it would cost from £20,000 to £30,000 to supply these meters to the 11,000 persons who at present are required to make the deposits. Mr. Kinloch Anderson thought that in this case the advantage to be derived from automatic meters would not be equal to the cost they would entail; and on his proposition, the Commissioners resolved not to introduce the meters. Subsequently Mr. Waterston called attention to the deposit system, which, he thought, shut out gas consumers; and he gave notice of a motion to procure a return of the number of households in which gas is not used, and of a remit to consider whether the deposit money could not be reduced.

On the subject of the extension of the Leith works, Mr. Linton pointed out that in the condensing and purifying departments, and in the meters, the limits of proper and economical working had been reached. He recommended the erection, on the land recently acquired adjoining the works, of a retort-house with accommodation for 512 retorts, and fitted with appliances for mechanical stoking; and other extensions, including a 1¼ million cubic feet gasholder at Blandfield, the total cost of which he estimated at £94,482. The Works Committee recommended application to Parliament for powers to have the extensions carried out. In support of this recommendation, Mr. Kinloch Anderson said that, if they had a proportionate increase in the output of gas during the next four years to that which they had had since they took over the undertakings in 1888, they would not have sufficient retort power. The Commissioners adopted the recommendation to apply to Parliament, but delayed meantime adopting Mr. Linton's report, as they wished to go before Parliament untrammelled by any decision as to the extent or details of the works they propose.

The Aberdeen Corporation on Wednesday adopted the accounts of the Gas Committee for the past year. In presenting them to the Council, Mr. Farquhar, the Convener of the Committee, said that in the year which was now current they were in a much better position than they were last year. Coal would cost them nearly £5000 less, and the receipts for residuals were improving, which enabled them to reduce the price of gas by 3d. per 1000 cubic feet. Unaccounted-for gas had gone up by 1·9 per cent. from the favourable position it was in two years ago—a loss amounting to £1400. Instructions had been given that the street department should be carefully looked after, so that this loss might be reduced another year. The present value of the works was only £20,000 in excess of what it stood at in 1871, although they were now producing about three times the amount of gas they did in that year. The permanent annuities payable by the Council had, however, on account of the fall in the value of money, reached such a price that they could not be bought at a figure which would yield more than 3 per cent.; and consequently the Council were saddled with correspondingly increased liability, if it were necessary to get rid of them. The erection of the new gasholder at Gallowhill was proceeding most satisfactorily. At present they had only storeage for 14 or 15 hours; but with the new holder, they would have storeage for 2¼ days' supply, which would be sufficient for a number of years to come. This very satisfactory narrative was not called in question by anyone; and the accounts were approved *nem. con.*

The Council also adopted the recommendation of the Committee in charge of the public lighting, to erect nine electric arc lamps. This resolution was, however, only adopted by a majority; opposition being taken on the ground that it was only the thin end of the wedge which was being introduced. It is noticeable that nothing was said as to the cost of the lamps, only that the charge is to be at the rate of 2½d. per hour. The lamps are to be 77 yards apart, which is too great a distance for efficient street lighting.

In Elgin, the Gas Commissioners this week took a different view of the matter of prepayment meters from the Edinburgh and Leith Gas Commission. The Gas Manager (Mr. Taylor) reported that a demand for penny-in-the-slot meters existed. He accounted for it by the fact that, as they only collected their accounts half-yearly, many who would be able to pay a penny or two, were unable to pay 10s. or 15s. at a time. He had had a number of the meters in operation for a few months; and they were working satisfactorily. He estimated that a consumption of 3000 cubic feet might be obtained through each meter; and he recommended that a further supply be bought. The Commissioners agreed to procure other 20 meters.

This has been another busy week in the matter of municipal elections. There is no prominent gas subject before any of the municipalities this year; but in nearly every place candidates feel themselves called upon to say something to the community regarding the gas supply. Where there is a gas company, almost invariably the remarks take the form of complaint; but where the gas undertaking is in the hands of the corporation, the reverse is the case—the speakers setting themselves to defend the management. At Hamilton, regarding which I had something to say last week, there is apparently a divergence from this rule, in respect that Mr. H. S. Keith, one of the Town Councillors, seems to have set himself to raise an election cry by denouncing the management of the gas-works. Mr. Keith's conduct has so disgusted some of the ratepayers that, in addition to remarks by some of the Councillors—and notably by Mr. Brown, the Convener of the Gas Commission—intended to place the circumstances of the management in a proper light, a member of the community (giving the initials A. G. M.) has come forward, and in the columns of the local newspaper, he gives facts regarding the gas-works which must prove to the public that, in the matter of gas management, Hamilton is well off. As matter of fact, the Gas Committee and the Manager (Mr. W. Ewing) are to be congratulated, rather than condemned, on their work of the past year. Mr. Ewing only entered upon his duties in August, 1892; and when he took office he found the Town Council considering proposals to expend £13,000 upon the gas-works, and to raise the price of gas. The receipts from tar and liquor fell from 10s. to 3s. 7d. per 100 gallons, entailing a loss during the last seven months of the year of £834, although 12,692 gallons more were sold than in the corresponding period of the previous year. During the past year, £814 more was paid for repairs, which were urgently required, the general tone of the works having been let down. When the year began, too, there were 712 tons of coal, costing £490, belonging to the previous year which were debited to it. The make of gas was 70,058,000 cubic feet—an increased output of 8¼ million cubic feet, although 171 tons of coal less were carbonized. During the latter half of the year, under Mr. Ewing's management, 4875 tons of coal were carbonized, which yielded 48,371,900 cubic feet of gas; whereas in the corresponding half of the previous year 5371 tons were carbonized, yielding 44,018,900 cubic feet. These results have been obtained by Mr. Ewing, instead of introducing the costly alterations proposed, converting the retort-settings into a regenerative system of his own design, in which there are five retorts in an oven, as against three in the old form. By this, for one thing, fully 50 per cent. of fuel is saved. In December of last year, 40,000 cubic feet of gas more were made with ten fewer retorts in use. During this year 15 new retorts have been put into old ovens which should lead to further savings.

Sometimes information comes out at these election meetings which is not divulged at the ordinary meetings of public boards. For instance, Bailie Lamond, of Broughty Ferry, informed the ratepayers that they had spent £1040 on extra purifiers, the cost of which was to be paid out of revenue, and that already they had paid off £400. Then came the information that, whereas the public lamps used to be free, they were now charging £250 a year for them, which was to be applied annually to the sinking fund. They proposed to send a deputation to Peebles, Alloa, or some other town, to see the working of the oil-gas plant. He added that they were experimenting with penny-in-the-slot meters, having six of them in operation, which gave 18 cubic feet of gas, or six hours' lighting, for 1d.

Two weeks ago I referred to the comparative cost of gas and electric lighting for the streets which it is proposed by the Edinburgh Corporation to light by electricity. It is almost needless to say that, without access to official documents, my figures were based upon calculations founded upon notes in my possession. Bailie Steel, the Convener of the Cleaning and Lighting Committee of the Town Council, is a candidate this time; and he referred to the subject last Thursday in an address to the electors—giving the exact figures. They are much worse for the electric light than mine. Whereas I made out a charge for gas of £606 a year, and for electricity of £2400, he, working upon Professor Kennedy's report, showed that 160 arc lamps would be required, the annual charge for which would be £4320; and, taking from the books of his department the exact cost for gas lighting of the streets named, he showed that it was £1277. This makes the cost for the electric lighting of a few streets to be £3042 more than by gas lighting—a sum which represents nearly ½d. in the pound on the rates of the city. There is already beginning to be grumbling by people who are interested in streets which are not included in the list, who naturally object to paying for conferring upon shopkeepers in other thoroughfares a privilege they will not themselves have.

Electric Lighting at Kingston-on-Thames.—Last Wednesday, the principal streets of the borough of Kingston-on-Thames were lighted by electricity for the first time. There are 36 arc lamps, each of 1000-candle power, employed; and they have displaced 75 gas-lamps. The new light has been installed at the Town Hall, Municipal Offices, and Free Public Library, as well as in several shops and private houses. The contract has been carried out at a cost of £16,000.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 4.

Sulphate of Ammonia.—A steadier feeling is gradually filtering in; and though it might be somewhat hazardous to make the assertion that the lowest point has been touched, still, if appearances do not deceive, we are not far from this consummation. At all events, the buying and selling is at the moment about equally matched; and many consumers' wants yet require filling this month. Consumers are still encouraged to nurse the hope of easier values; but there will probably be some disappointment. Actual spot business is not below £12 10s., nor yet above £12 12s. 6d., according to point of delivery and colour; and the lower quotations published are more or less of a fictitious nature. Makers have mostly refused forward engagements; and any business reported is speculative. Nitrate is steady, at 9s. 1½d.

LONDON, *Nov.* 4.

Tar Products.—Business in tar products during the week has been more brisk; and the tendency of prices continues upward. Benzol is in good demand, at 1s. 6d. for 90's and 1s. 7½d. for 50's; and transactions have been reported in pitch at 26s. 6d. to 27s. 6d. f.o.b. Creosote is very scarce. The stocks throughout the country have been used up as fuel; and a great portion of the make is still going in this direction. The increase in consumption for illuminating purposes is also having effect; and the probability is that prices will be maintained. The position of carbolic acid is stronger; and the Committee have now fixed the price of 1s. 7d., at buyers' works, for 60's. Anthracene is firm, both for "A" and "B" qualities. Prices may be taken as follows: Tar, 16s. to 17s. Pitch, 26s. 6d. to 27s. 6d. Benzol, 50's, 1s. 7½d.; 90's, 1s. 6d. Creosote, 2½d. Creosote salts, 30s. Solvent naphtha, 1s. 3d. Toluol, 1s. 8d. Crude benzol naphtha, 30 per cent., 8½d. Carbolic acid, 60's, 1s. 7d.; crystals, 5¾d. Cresol, 1s. 2d. Anthracene, 30 per cent., "A," 1s. 2d.; "B," 10d.

Sulphate of Ammonia.—The bottom seems to have been touched in sulphate; and, although no improvement has arisen during the week, to-day's price has remained firm since the sudden collapse. There is a stronger tendency on the part of buyers to cover their requirements for the next two or three months; but sellers for the most part fight shy of forward business. Gas liquor is quoted at 7s. to 8s. per ton.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—During the past week, anticipations of a possible settlement of the coal trade dispute have necessarily had some effect upon the market—not so much, however, in bringing down prices as in causing buyers to hold back from placing out further orders of any weight at the current quoted rates. There has, however, been an unmistakeably downward tendency; and supplies of coal have been coming in from districts in the more immediate neighbourhood of Lancashire at sufficiently low prices as to practically drive Scotch coal out of the market, owing to the high cost of carriage from the collieries in Scotland. The supplies coming forward upon old orders have generally been ample to meet requirements; but further buying has been considerably restricted at the prospect of some scarcity during the ensuing week. The average prices which have been ruling generally for coal from outside districts, delivered here at stations and wharves, have been about 16s. to 17s. for engine fuel; 19s. to 21s. for good steam coal; with round coals ranging, according to quality, from 22s. up to 25s. and 26s. per ton. Merchants and dealers who have had anything like quantities on hand, have, however, been in some cases pushing sales at under the above figures; but this underselling has had no appreciable effect upon general quoted prices, and representatives of collieries in outside districts have been very firm in holding to their rates—some of them even asking a slight advance upon recent quotations. The pit prices at the Lancashire collieries that are working have remained at about 16s. to 17s. for engine fuel; 19s. to 21s. for round coals; with 19s. to 20s. representing about the prices quoted for gas coals. The collapse for the present of the negotiations for a settlement, which were attempted at the joint conference in London, destroys any hope of a general resumption of work at any rate during the present month, and may possibly have some further hardening effect upon prices. The whole case is, however, being put before the miners in the various districts; and during the present week pit meetings and conferences will be held. But it is very doubtful whether they will be disposed to go further than the proposals offered by their leaders, and which the coalowners have declined to accept.

Northern Coal Trade.—There is a very strong demand for coal still experienced in the North-east, and especially for gas coal; but the lower shipments have allowed a larger margin of the production to be available for the supply of the Midlands. Best Northumbrian steam coals are quoted at 14s. per ton f.o.b.; but the price must now alter from day to day, and quotations will vary according to the time of delivery, and the extent of the orders that the collieries have. Second-class steam coals are from 1s. to 1s. 6d. per ton below the best quality; and small steam coals are from 6s. to 6s. 6d. per ton f.o.b. Gas coals are very firm. The deliveries on old contracts are now very heavy, and must continue so for two months; so that there has been only a very limited amount of free coal to meet inland requirements. Such lots as have thus been available have commanded very high but irregular prices—as much as 11s. per ton at the colliery having been paid for odd lots. The general tendency of the market must now be upwards, it is believed, for not only have the stocks at the collieries been well used up, but it is thought that there has been also the using up of most of the stock at the Midland gas-works. Coke is somewhat firmer, with a better demand. The price for best Durham qualities is about 15s. 6d. per ton f.o.b.; and rather better shipments are taking place from the Tyne, West Hartlepool, and the Wear. Gas coke is unaltered in price, but is more abundant. In the Northern coal trade, the prevailing idea seems to be that we must now expect an irregular tendency in prices for some time; the downward movement being checked by the larger consumption that is usually known at this period of the year.

Scotch Coal Trade.—There is still an extraordinary demand for Scotch coal for English consumers, which makes the time lively for all. The men are working steadily, and are thereby reaping the advantage of the increased output. In the early part of the week, the Lothians miners came out on strike in support of an advance; but on the masters conceding an increase of 10 per cent. in wages, they all returned to work, except at the Newbattle collieries, where the men are locked out because of their resolution to work only four days a week. There is every reason to expect a severe struggle there; and over 700 men are affected. At a conference of miners' delegates in Glasgow on Friday, a resolution was adopted in favour of an international conference being held, to devise means for regulating the output of coal according to the demand in the different districts. The intention of the promoters is to prevent the accumulation of coal at the pit banks; and so to render strikes impossible, by keeping the masters at the mercy of the men. Although the demand for coal is large, it is reported that English buyers are not offering so much for it—being probably desirous, in the event of the English strike terminating, to have as little coal on hand as possible. Quotations are, therefore, not quite reliable. For this week, they are: Main, 10s. to 10s. 6d.; ell, 10s. 9d. to 11s.; splint, 10s. 9d. to 11s.; and steam, 11s. f.o.b. Glasgow, which are the same figures as were given last week. Shipments for the week amounted to 217,205 tons—an increase over the amount for the preceding six days of 5107 tons, and over the corresponding period of last year of 42,362 tons. For the year to date, the shipments have been 6,425,287 tons—an increase over those of the corresponding period of last year of 29,980 tons.

The Price of Gas at Longwood.—We are asked to state that the price of gas at Longwood, near Huddersfield, to which reference was made in the JOURNAL last week (p. 813), is 3s. 3d. per 1000 cubic feet—a similar rate being charged in the Golcar and Linthwaite districts—and 2s. 9d. in the Lindley district; less 5 per cent. discount if the accounts are paid within two months from their date.

Increases in the Price of Gas.—The Westhoughton Gas Company have given notice that, in consequence of the increased cost of coal, the price of gas will be 4s. 6d. per 1000 feet to all consumers for the present. This means an advance of 4d. to ordinary consumers, of about 1s. to the large consumers, and 1s. 5d. to the Local Board. The Colne Local Board have decided to raise the price of gas 6d. per 1000 feet, for the same reason. The present price is 3s., less 5 per cent. discount if paid within 21 days from the date of the account. The Rossendale Union Gas Company have announced an increase of 3d. per 1000 cubic feet in the price of gas.

Fatality to a Gas-Fitter.—Last Friday, Mr. Mortimer Bayliss held an inquest at Bramley, near Guildford, on the body of Frank Martin, a gas-fitter who was fatally burned at a gas explosion a short time previously. It appeared that he was remedying a stoppage in a pipe leading to a gasholder on the premises of the St. John's Roman Catholic Seminary at Wonersh, and when the obstruction was removed, the gas rushed out of a 4-inch pipe, and ignited at a fire some 10 feet distant. The deceased was working in a hole in the ground at a depth of 11 feet; and the ladder had been removed by his directions. The hole was at once filled with flame, which continued for three or four minutes, until the holder was emptied. Before deceased could escape, a rope had to be lowered, which he had the presence of mind to tie round himself, and thus enable his friends to draw him out. He was terribly burned, and died a few days after. A verdict of "Accidental death" was returned.

Southampton Gas Company.—At the half-yearly general meeting of this Company last Wednesday, the Directors reported a sum of £11,987 available for division; and they recommended the payment of maximum dividends on all classes of shares, less income-tax. These would, it was stated, amount to £7768; and consequently leave a balance of £4219 to be carried forward. The erection of additional works, and the laying of larger mains, have necessitated the raising of more capital. This was done by a sale, on the 20th ult., of 200 "A" (£25) shares, which realized £7362 10s., or at the rate of £36 16s. 3d. per share. During the six months ending June 30 last, there was an increase of 10,272,000 cubic feet in the quantity of gas sold, as compared with the corresponding period of 1892; and the works (under the supervision of Mr. S. W. Durkin) are fully capable of meeting the constantly increasing demand upon them. In moving the adoption of the report, the Chairman (Mr. R. C. Hankinson, J.P.) said that there was one matter mentioned in it which would be of interest to the shareholders—viz., that, independently of the Directors or the Manager, a sort of Union had been initiated by the men in the service of the Company. It was called the Southampton Gas-Works Permanent Benefit Society; and its object was to provide funds to meet cases of sickness or accident, and pay for the burial of members or members' wives. There was also to be established a superannuation fund. The Directors recognized the responsibility which devolved upon all employers of labour; and they had very cordially and readily welcomed the proposal—believing it to be by far the best way of fostering kindly feelings between employers and employed. A good deal was now heard about Trades Unions; but a society of this kind was the best sort of union. The Board had decided to give it substantial help; and he was sure the shareholders would support them in it, and wish the funds every prosperity. With regard to other matters, the Directors had entered into contracts with the Eastleigh Local Authority for supplying lamps and lighting the district on the average meter system. The Company had not been at all affected by the dispute in the coal trade. He concluded by referring to the recent visit of the members of the Institution of Gas Engineers to the Company's works. Mr. Sampson, in seconding the motion, stated that the Directors were watching closely the "penny-in-the-slot" system of supplying gas; but, before adopting it, they were desirous of seeing how it worked with the larger undertakings. The report was adopted, and the dividends were declared.

The New Conveyor Company's Appliances.—The New Conveyor Company, Limited, of London and Aberdeen, are supplying a combined engine and mortar-mill, to the order of Mr. R. S. Carlow, for the Arbroath Gas-Works, of the same pattern as one recently delivered to Mr. J. M'Gilchrist at Dumbarton. The Company are also furnishing the complete elevator plant, including the engine, for the new automatic purifier-house at the Southport Corporation Gas-Works under the supervision of the Engineer (Mr. Booth). The new design of coke elevators supplied by the Company for the new retort-house at the Huddersfield Gas-Works (Mr. W. R. Herring) are reported to be a complete success.

Proposed Purchase of the Fowey Water-Works by the Rural Sanitary Authority.—Last Friday week, Colonel C. H. Luard held an inquiry at Fowey into an application which had been made by the St. Austell Sanitary Authority to the Local Government Board for power to borrow £9000 for supplying Fowey with an improved water supply (including the purchase of the undertaking of the Water Company). Considerable opposition was displayed by ratepayers to the scheme; and the financial statement of the Company was considered to be unsatisfactory. Pending an explanation by the Company, and the decision of the Local Government Board, the Sanitary Authority asked to be allowed to borrow £100 to carry out further gauging operations.

Sewage Scheme for Ludlow.—The Corporation of Ludlow lately advertised for schemes of sewage disposal for the borough, and an adjoining district, which it is proposed to include within the limits of the borough area. Three premiums were offered for the best schemes. Eighteen were submitted; and the Corporation unanimously resolved to award the premiums to the following competitors: (1) Messrs. Pollard and Tingle, of Westminster; (2) Mr. H. Bancroft, of Manchester; (3) Mr. H. B. Nicholls, of Birmingham. The Corporation have further decided to appoint Messrs. Pollard and Tingle the Engineers to carry out the works; and they intend to apply for a Provisional Order to acquire the land recommended to be taken, in the event of their not being able to agree with the owner for the purchase.

The Sanitary Condition of Florence.—The correspondent of *The Times* in Rome has lately received two communications from residents in Florence, complaining of the water supply. The first (a lady) declared the city to be perfectly pestilential—every street having its own evil smell; and she suggested that it would be a good thing if the Syndic and Corporation could be chained over the sewer-vents for 24 hours, as a slight punishment for their neglect. The other writer testified to the lack of water; many people having, he said, to pay to have it brought from outside the city. According to our contemporary's correspondent, "the reports of the improvement of the water supply since Sir Douglas Galton's investigation are only the pious desires of those who are interested in the temporary increase of the population of the city by foreigners."

Tunbridge Wells Water Supply.—For some time past, the question of the water supply of Tunbridge Wells has been under the consideration of the Corporation; and a report has recently been presented to the Water Committee by the Consulting Engineer (Mr. J. Mansergh), recommending the construction of a new reservoir in Ashdown Forest, at a cost of £100,000, to cover the deficiencies in the present supply from the Pembury and Tangiers reservoirs. It is stated in the report that the present water supply from these sources is 486,000 gallons per day; whereas, with a population of 31,000, the quantity required daily is something like 620,000 gallons. In view of the rapid increase in the population, it is estimated that 30 years hence there would be a daily deficiency of about 414,000 gallons. Mr. Mansergh's report was considered at a special meeting of the Town Council last Friday week, when, after considerable discussion, it was decided to adjourn the matter until March next.

The Proposed Purchase of the Kendal Gas and Water Works.—A draft agreement for the transfer of the undertaking of the Kendal Union Gas and Water Company to the Corporation of Kendal has been prepared. It provides that the Company shall sell, and the Corporation shall purchase, the whole undertaking of the Company. The purchase-money is to be £80,000; and the Corporation are, in addition, to take over all the liabilities of the Company at the date of completion. One clause provides that the purchase-money shall be apportioned by the Company as follows: The sum of £14,820, or £39 per share, as the price of the interest of the 380 preference shares of the Company; and £65,175, or £21 14s. 6d. per share, as the price of the interest of the holders of the 3000 ordinary shares of the Company. The draft agreement further provides that the sale and purchase shall be deemed to take effect as from June 30, 1893; and th e date of completion shall be June 30, 1894, or one month after the Royal Assent shall have been given to the Act of Parliament authorizing the transfer. Beyond the £80,000 the Corporation will provide £350 towards the costs of the proceedings in the matter of the transfer.

The Gas and Water Works Purchase Question at Accrington.—In a recent JOURNAL we announced that the Local Authorities in the vicinity of Accrington had agreed to the acquisition, in conjunction with the Accrington Corporation, of the undertaking of the Accrington Gas and Water Company. A meeting of ratepayers of the borough was subsequently held to consider the question. The Mayor (Mr. Alderman Whittaker) presided, and moved a resolution authorizing the purchase, and the taking of the necessary steps to give effect to it. He stated that the Corporation made it impossible for the Company's Bill to proceed last session until they agreed to sell the undertaking. On the terms arranged, the Local Authorities would have a balance of £742 per annum, after providing for annuities and sinking fund. The concern would thus be self-supporting; and it would eventually come into the hands of the ratepayers without entailing any burden upon them. It was probable that they would be also able to devote something to the relief of the rates; but he did not promise this. The resolution was carried; but there were several dissentients to it. Last Tuesday, unissued stock to the value of £10,000 in the Company was offered for sale by auction, preparatory to the sale of the undertaking. The stock was eventually knocked down to the Town Clerk of Accrington, on behalf of the Local Authorities, for £15,500.

Sewage Scheme for Alcester.—A scheme has been prepared by Mr. E. Pritchard, M.Inst.C.E., and accepted by the Sanitary Authority, for the disposal of the sewage of Alcester upon the international system of ferozone and polarite.

St. Helens and the Electric Light.—On the recommendation of a Sub-Committee who have been considering the question of the supply of electricity for lighting purposes in the borough, the St. Helens Corporation Gas Committee have decided to apply for powers. The Town Clerk will accordingly take the necessary steps to procure next session a Provisional Order under the Electric Lighting Acts.

Failure of Gas-Engine Makers.—Under the receiving order recently made against Joseph Day and Jules Dent Young, mechanical engineers, trading under the style of Day and Co., a statement of affairs has just been lodged, showing liabilities £27,505, of which £16,315 is expected to rank, and assets estimated to produce £17,728. From the observations of the Senior Official Receiver, it appears that the business was established at Bath in 1878 by Mr. Day; and that he was joined in partnership by Mr. Young in 1887. In 1891 the debtors purchased the patent of a gas-engine; and they have since expended large sums in experimenting, exhibiting, and financing an engine of their own. They state that a Syndicate, which has been formed for the purpose, is prepared to purchase all the patent rights, except the American—the consideration to be paid partly in cash and partly in shares. They attribute their failure more immediately to inability to realize their interest in their valuable patents. The insolvency is also accounted for by losses through bad debts and depreciation in investments during the last ten years, amounting to about £5000. The unsettled liabilities include claims amounting to nearly £9000 in respect of borrowed moneys and bills discounted. The securities held by creditors treated as "fully secured" (£16,500) are stated to represent certain charges on patents and mortgages on the lease of the debtors' premises at Bath. The creditors "partly secured" (£4627) are stated to hold shares (estimated at £981) and guarantees and bills held by the bank. Other property (£4500) is said to consist of the stock of patterns, one moiety of the American patent of "Day's gas-engine," and a joint license to manufacturers under the Syndicate already referred to. A scheme of arrangement is to be submitted to the creditors.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 842.)

Issue.	Share	When ex-Dividend.	Dividend & Div. Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	13 Oct.	10½	Alliance & Dublin 10 p. c.	10	16½—17½	..	6 0 0
100,000	10	"	7½	Do. 7 p. c	10	11½—12½	..	6 0 0
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	102—104	..	4 16 2
100,000	20	31 May	8	Bahia, Limited	20	10¼—11½	..	13 18 3
200,000	5	12 May	6½	Bombay, Limited	5	5½—6	..	5 8 4
40,000	5	"	6½	Do. New	4	3¾—4¼	..	5 13 0
380,000	Stck.	16 Aug.	11½	Brentford Consolidated	100	220—225	..	5 2 2
180,000	"	"	8½	Do. New	100	163—168	−2	5 1 2
220,000	20	15 Sept	11½	Brighton & Hove Original	20	40—42	−1	5 9 6
888,500	Stck.	31 Aug.	5	Bristol	100	102—105	..	4 15 3
320,000	20	29 Sept.	11½	British	20	42—44	..	5 4 7
50,000	10	31 Aug.	11½	Bromley, Ordinary 10 p. c.	10	19—20	..	5 15 0
51,510	10	"	8½	Do. 7 p. c.	10	15—16	..	5 6 3
328,750	10	28 July	2	Buenos Ayres (New) Limited	10	6 -7	..	2 17 2
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	97—100	..	6 0 0
150,000	20	13 July	8	Cagliari, Limited	20	26½—27½	..	5 16 4
550,000	Stck.	13 Oct.	12½	Commercial, Old Stock	100	244—249	−1	5 0 4
165,000	"	"	9½	Do. New do.	100	187—192	..	4 19 0
160,762	"	15 June	4½	Do. 4½ p. c. Deb. do.	100	125—130	..	3 9 3
800,000	Stck.	15 June	13	Continental Union, Limited	100	230—235	..	5 10
200,000	"	"	10	Do. 7 p. c. Pref	100	191—196	..	5 2 0
75,000	Stck.	15 Sept.	10	Crystal Palace District	100	185—190	..	5 5 3
486,090	10	28 July	10	European, Limited	10	21—22	..	4 10 11
354,060	10	"	10	Do. Partly paid	7½	14½—15½	..	4 17 0
5,646,590	Stck.	16 Aug.	12	Gaslight & Coke, A, Ordinary	100	220—225	−3	5 6 8
100,000	"	"	4	Do. B, 4 p. c. max.	100	97—102	..	3 18 5
665,000	"	"	10	Do. C, D, & E, 10 p.c. Pf.	100	263—268	..	3 14 7
30,000	"	"	5	Do. F, 5 p. c. Prf.	100	120—125	..	4 0 0
60,000	"	"	7½	Do. G, 7½ p. c. do.	100	183—188	..	3 19 9
1,300,000	"	"	7	Do. H, 7 p. c. max	100	173—178	..	3 18 7
463,000	"	"	10	Do. J, 10 p. c. Prf.	100	263—268	+1	3 14 7
476,000	"	"	6	Do. K, 6 p. c. Prf.	100	157—162	..	3 14 1
1,061,150	"	15 June	4	Do. 4 p. c. Deb. Stk.	100	127—130	..	3 1 6
294,850	"	"	4½	Do. 4½ p. c. do.	100	132—137	..	3 5 8
908,000	"	"	6	Do. 6 p. c. do	100	175—180	..	3 6 8
3,800,000	Stck.	12 May	12	Imperial Continental	100	222—227	−3	5 5 9
75,000	5	15 June	6	Malta & Mediterranean, Ltd.	5	5—5½	..	5 9 1
560,000	100	2 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	104—106	..	4 14 2
541,920	20	15 June	5	Monte Video, Limited	20	12¾—13½	..	7 8 2
150,000	5	31 May	10	Oriental, Limited	5	7¼—7¾	..	5 9 0
60,000	5	29 Sept.	7	Ottoman, Limited	5	4—4½	..	7 15 6
166,870	10	—	2	Pará Limited	10	1½—2	..	—
420,000	100	2 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	98—102*	..	5 17 8
500,000	100	1 June	6	2nd Do.	100	98—102	..	5 17 8
150,000	10	13 Oct.	5	San Paulo, Limited	10	8½—9½	..	5 5 3
500,000	Stck.	31 Aug.	15½	South Metropolitan, A Stock	100	304—309	..	5 0 4
1,350,000	"	"	12	Do. B do.	100	248—253	..	4 14 10
260,000	"	"	13	Do. C do.	100	258—263	..	4 18 9
750,000	"	13 July	5	Do. 5 p. c. Deb. Stk.	100	148—152	..	3 5 9
60,000	Stck.	31 Aug.	11½	Tottenham & Edm'nton, "A"	100	210—215	..	5 7 0
				WATER COMPANIES.				
744,897	Stck.	29 June	10	Chelsea, Ordinary	100	270—275	..	3 12 9
1,720,252	Stck.	13 Oct.	8	East London, Ordinary	100	214—219	−1	3 13 0
544,440	"	29 June	4½	Do. 4½ p. c. Deb. Stk.	100	140—143	..	3 2 11
700,000	50	15 June	8½	Grand Junction	50	114—118	..	3 12 0
708,000	Stck.	16 Aug.	11	Kent	100	284—289	−1	3 16 1
1,043,800	100	29 June	9½	Lambeth, 10 p. c. max.	100	245—250	..	3 16 0
406,200	100	"	7½	Do. 7½ p. c. max.	100	199—204	..	3 13 6
310,000	Stck.	29 Sept.	4	Do. 4 p. c. Deb. Stk.	100	128—131	..	3 1 0
500,000	100	16 Aug.	12½	New River, New Shares	100	335—340	..	3 11 4
1,000,000	Stck.	28 July	4	Do. 4 p. c. Deb. Stk	100	132—135	..	2 19 3
902,300	Stck.	15 June	6	S'thwk & V'xhall, 10 p. c. max.	100	155—160	..	3 15 0
126,500	100	"	6	Do. D 7½ p. c. do.	100	145—150	..	4 0 0
1,155,066	Stck.	15 June	10	West Middlesex	100	262—267	..	3 14 10

*Ex Div

Earby and Thornton Gas and Lighting Company, Limited.—This Company has been registered, with a capital of £10,000, in £10 shares, to acquire and carry on the Earby Gas-Works, in the parish of Thornton, in the West Riding of York, belonging to the Mill Company, Limited, and to manufacture and supply gas and light in Thornton and elsewhere in the counties of York and Lancaster.

Fire Caused by the Fusion of Electric Wires.—The fusion of electric light wires resulted in an outbreak of fire early on Monday morning last week at the Raleigh Club, Regent Street. The outbreak occurred in the passage on the first floor, and about 12 feet by 12 feet of the flooring and joisting was involved in flames when the club servants brought into play one of the private hydrants fitted to the establishment. This prompt action checked the mischief; but considerable damage was caused to the floor and ceilings, as well as to the contents beneath, by water.

Fylde Water Company.—At the recent half-yearly general meeting of this Company, the report, which was noticed in the JOURNAL for the 17th ult., was adopted. At the close of the ordinary business, a motion was unanimously passed authorizing the Company to issue the sum of £20,000 of 4 per cent. preference stock; being a portion of the amount sanctioned by the Fylde Water-Works Act, 1891.

Awards at the Cookery and Food Exhibition.—The Judges at the Universal Cookery and Food Exhibition recently held at the Portman Rooms, and noticed in the JOURNAL last week, have awarded a special silver medal to Messrs. R. and A. Main for their "School Board" cooker—a stove specially constructed for the use of children; and a gold medal to Messrs. W. Sugg and Co., Limited, for their exhibit of gas cooking appliances, comprising their "Westminster" kitcheners, patent "Confectioner" ovens, improved "Roberts" and other grillers, gas fires, burners and lamps, and ventilating specialities, &c.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM LONDON." **GWYNNE & CO.,** TELEPHONE No. 2698.

HYDRAULIC AND GAS ENGINEERS, BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

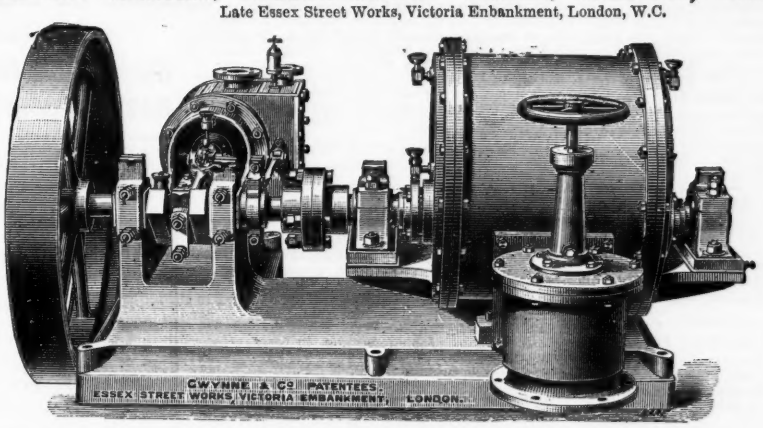
Late Essex Street Works, Victoria Enbankment, London, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co., for Gas Exhausters, &c.

They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 30,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and can be referred to.



Engine and Exhauster Combined on One Bed-Plate.

GWYNNE & Co.'s Exhausters are constructed of large size to pass the required quantity of Gas at very slow speeds; the wear and tear being reduced to a Minimum.

Catalogues and Testimonials sent on Application.

Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

NO OTHER MAKER CAN DO THIS.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; PATENT SELF SEALING AND CLEANSING RETORT-LIDS AND MOUTHPIECES; CENTRIFUGAL PUMPS and PUMPING ENGINES specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

ANDREW STEPHENSON, Agent.
Please address all communications to the Company, as above.

ANDREW STEPHENSON, Agent for BRIN'S OXYGEN COMPANY, Limited, Westminster, S.W.
City Address: 182, Gresham House, Old Broad Street, LONDON, E.C.

VOLCANIC Fire Cement (Winkelmann's)
Fire Resistance 4500° Fahr.
ANDREW STEPHENSON, Sole Agent, 182, Gresham House, Old Broad Street, LONDON, E.C.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH.
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEAR DALKEITH, } SCOTLAND.

GOLD MEDAL, 1892.

TUBES and Fittings for Gas, Steam, and Water, in stock to 8 inches diameter; Iron and Steel Ascension-Pipes.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield; AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 874 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock, Oldham."

LIQUOR, Tar, and Spent Oxide wanted.
BROTHERTON AND CO., Ammonia and Tar Distillers, BIRMINGHAM, LEEDS, and WAKEFIELD.

CHARTERING, FORWARDING, AND INSURANCE.

ROBERT BRUCE FITZMAURICE, 29, Great St. Helens, London, Shipping Agent to several Gas Companies and Plant Manufacturers, would be glad to UNDERTAKE LARGE or SMALL SHIPMENTS to any Port.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works sundries. (See last week, p. 783).
Telegrams: "HUTCHINSON BROS., BARNSLEY."

MR. J. C. CHAPMAN, Fellow of the Chartered Institute of Patent Agents, advises on all matters connected with LETTERS PATENT FOR INVENTIONS and the PROTECTION OF TRADE MARKS, &c., at home and abroad. Preliminary Information and Handbook on application.
70, Chancery Lane, London, W.C.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE & CO., direct Importers from Ireland. Sample and Price on application.
OXIDE PAINT, SULPHURIC ACID, & Chemicals.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore, Particulars and price, apply to MR. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

MESSRS. DEBENHAM, TEWSON, FARMER, and BRIDGEWATER'S MONTHLY LIST of Shops, Show-Rooms, Factories, and Waterside Premises, suitable for the Exhibition and Manufacture of Engineering and other Appliances, may be obtained, free of charge, at their Offices, 80, CHEAPSIDE, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors, for the erection of Gas-Works for Towns, Villages Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."

G. L. LAMBERT, 26, Alberta Terrace, Nottingham. Consultations, Advice, Reports in Various Branches of **Practical** Mechanical Engineering and Machinery. **Specialities** in Water, Sewage, and Gas Plant Making. **Surveyor** of Steam-Ships, Marine Engines, Boilers, and General Machinery. **Detailed Inspection** of Engineering Contracts during Manufacturing and Erection.

TO GAS AND WATER COMPANIES AND MANAGERS.

AN ASSOC.M.INST.C.E. having an extensive experience in GAS and WATER WORKS' DESIGN and ERECTION, now Chief Assistant in a large Gas-Works and Engineer to several small ones, having designed and erected a THREE HUNDRED and a ONE HUNDRED MILLION GAS-WORKS complete, besides several small ones, also ENLARGED many other Works, including NEW LIFTS to EXISTING GASHOLDERS, REGENERATIVE SETTINGS, &c., would be pleased to VISIT WORKS and ADVISE on their EXTENSION or ALTERATION, making SPECIFICATIONS, DRAWINGS, ESTIMATES, and superintend erection if desired.

SPECIALITIES.

Any EXTENSION or ALTERATION to GAS or WATER WORKS. ASSESSMENT of Gas-Works. New HOLDERS, TANKS, ROOFS, PURIFIERS, or FILTER-BEDS. TELESCOPING or adding FRESH LIFTS to EXISTING HOLDERS.
REGENERATIVE SETTINGS, for SMALL GAS-WORKS, without Excavations. SAVING 20 PER CENT. in first cost, renewals, and working.
Address "Boz," 9, Gracechurch Street, London, E.C.

WANTED, by a young married Man, a Situation as WORKING MANAGER of Gas-Works. Has held his present management four years (steam engine and exhauster employed).
Apply, by letter, to No. 2299, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ADVERTISER (aged 28), who has been Managing Secretary to small Gas-Works for four years, is wanting an APPOINTMENT in larger Works, Gas or Water. Exceptional testimonials from Directors, Shareholders, and Auditors. Would not object to represent a Manufacturer. An interview solicited.
Address No. 2297, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, by the Advertiser (aged 29, and total abstainer), a Situation on a Gas-Works as ASSISTANT to Engineer or Manager, or Bookkeeper. Six years in present Situation. Speaks Portuguese thoroughly. No objection to go abroad. Will be disengaged by end of January, 1894. Good references.
Address No. 2293, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TO GAS ENGINEERS AND MANAGERS.

ADVERTISER desires a Situation as WORKING FOREMAN. Has had considerable experience in Constructing, Erecting, and Supervision; and thoroughly understands the routine of Gas-Works throughout. Has acquired thorough knowledge of the most modern methods in Carbonizing, Gas Purification, and Distribution.
References and testimonials forwarded on application, by letter, to No. 2300, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, in a Gas and Water Office in Surrey, a Young Man as ASSISTANT CLERK (able to Collect Accounts). Security required.
Applications, stating experience and salary expected, to be addressed to No. 2298, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Working Gas Manager for . the Kirkby Stephen Gas Company. He must be able to take Meters, lay Service-Pipes, and do all Work connected with Gas Making. Wages, 24s. per week, with House, Coal, and Gas free.
Applications, with testimonials, to be forwarded to Mr. L. Fairer, Kirkby Stephen.

SUTTON, SOUTHCOATES, & DRYPOOL GAS-WORKS, HULL.

WANTED, a competent Working Foreman for the above Works. Must be a good Carbonizer and Mechanic, and have held a similar position. One with a knowledge of generator firing preferred.
Apply, stating age, with references and wages required, to the Manager.

ST. AUSTELL GAS-WORKS.

WANTED, a Man who thoroughly understands the making of Gas, Sulphate of Ammonia, and the General Management of a Gas-Works, as MANAGER of the above Works. The Manager would have to keep the Accounts, and collect the Gas and Meter Rents. House, Gas, Fuel, and Rates and Taxes provided and paid by the Company.
Applications, stating experience and former occupation, with salary required, to be sent to R. G. Lakes, Esq., Trevarrick, St. Austell, Cornwall, on or before Saturday, Dec. 2 next.
Nov. 1, 1893.

WANTED, Gas Liquor.
Address George Dobson, Limited, Cardiff.

WANTED, at once, about 400 yards of 2 and 3 inch CAST-IRON SOCKET GAS-MAINS, with Bends, Syphons, and Specials for same.
Address S. G. Tulk, Gas-Works, Builth Wells.

TO BE SOLD—A Station Meter, in Good Working Condition, with Clock, Tell-Tale, By-Pass Valve, 6-inch Connections, and two Cup Valves, at the Elsecar Gas-Works, Barnsley. Price £10 net.

THE Madeley Coal and Iron Company, Limited, Madeley, near Newcastle, North Staffordshire, have some GAS COALS to sell. Prompt delivery.
Telegraphic Address: "Settle, Madeley, Staffs."
Agents South of Stafford: Messrs. J. Hackett & Co., Leamington.

MONTE VIDEO GAS COMPANY, LIMITED.

NOTICE is hereby given, that the BOOKS for the TRANSFER OF SHARES WILL BE CLOSED from Monday, the 13th of November, to Saturday, the 25th of November, 1893, both days inclusive, for the preparation and issue of warrants in payment of an Interim Dividend for the Half Year ended the 30th of June, 1893.
By order of the Board,
A. G. Hounsham,
Secretary.
Offices of the Company:
321, Dashwood House, New Broad Street,
London, E.C., Nov. 2, 1893.

EAST LONDON WATER-WORKS COMPANY.

ISSUE OF NEW CAPITAL.

NOTICE is hereby given, that the Directors are prepared to receive TENDERS for £35,000, being the sixth and final portion of the NEW PERPETUAL DEBENTURE STOCK of the Company, to bear Interest at 4½ per cent. per annum, free of Income-Tax, such Tenders to be delivered at the Company's Offices, St. Helen's Place, in the City of London, not later than Eleven o'clock, a.m., on the 14th day of December, 1893, and payment of accepted Tenders made on the 22nd of December.
Particulars and Conditions, together with Form of Tender, may be obtained at the said Offices, or will be forwarded on application.
By order of the Court of Directors,
Isaac Adolphus Crookenden,
Secretary.
St. Helen's Place, London,
Nov. 4, 1893.

Price 2s. per dozen, or 10s. 6d. per 100, post free.

CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.
Printed copies of this Section, in large type, on broad sheets, may be obtained of Walter King, 11, Bolt Court, Fleet Street, E.C.
*** The Act extends to Scotland and Ireland.*

Now Ready, Price 15s., Limp Cloth, the Thirteenth Yearly

ANALYSIS OF THE ACCOUNTS OF THE Metropolitan Water Companies,

Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, and West Middlesex—showing the Capital, Income, Expenditure, Profits, and Dividends per Million and per Thousand Gallons of Water supplied; the proportion of Expenditure and Profits to gross Income; and the Income, Expenditure, and Profits per House, &c., supplied for the year ended December 31, 1892, or March 31, 1893, together with the quantity of Water supplied, the estimated daily quantity supplied for domestic and other purposes, the quantity supplied per head of population, &c., &c., for the year ended December 31, 1892.

Compiled and arranged by
ALFRED LASS, F.C.A.

London:
WALTER KING, 11, Bolt Court, Fleet Street, E.C.

MEIKLEJOHN'S PATENT
Improved Slide-Valve Anti-Dip.

Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.
Is cheap and easily fixed to any form of main.
Will be found the most efficient appliance of the kind yet introduced.
Further particulars and price from
C. MEIKLEJOHN,
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(Late N. Meiklejohn, Longwood.)

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

COKE BREAKERS,
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT.)
New Design, with two Cutting Rollers, making less Breeze than their old pattern.
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PARK STREET, SOUTHWARK, E.C.,
And at STROUD, GLOUCESTERSHIRE.

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Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.
For Prices and Particulars, apply to
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works
(also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
Note.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

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CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL
ENGLISH & SCOTCH CANNELS.
REAL SILKSTONE GAS COAL
ANALYSIS AND PRICES ON APPLICATION.
T. B. KITTEL, SHEFFIELD.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

ARMSTRONG'S PATENT
CANDLE SAFETY LAMPS

No. 1. No. 2. No. 3.
43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 Candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

NIDDRIE CANNEL
A FIRST-CLASS CANNEL COAL,
Yielding a large volume of rich Gas, and fully 60 per cent. of first-class Coke.

FOR ANALYSIS, PRICE, AND ALL OTHER PARTICULARS, APPLY TO
The Niddrie & Benhar Coal Co., Ltd.,
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SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
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STEEL OF ALL DESCRIPTIONS
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BOLDON GAS COALS.
Worked by THE HARTON COAL CO., LTD.,
Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Ipswich Gaslight Company, Devonport Gas Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the
HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

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OXIDE OF IRON.
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NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed

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Telegrams: "HUNTER PORT GLASGOW."
Established 1872.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON AND COAL COMPANY, Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—

[COPY.]

TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.

Tudhoe Gas-Works,
Spennymoor,
8th June, 1893.

Messrs. The
WEARDALE IRON & COAL COMPANY, LTD

GENTLEMEN,

For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13½ cwt.
Illuminating Power of Gas, average of a series of tests, **17 Sperm Candles.**
The Coke was of excellent quality.

The following is a complete ultimate Analysis of the Coal.

	Per Cent.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
	100·00

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

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WEARDALE IRON & COAL Co., Ld.
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OUGHTYBRIDGE, NEAR SHEFFIELD.
Established 1858. The First Manufactory of Silica and Dinas Fire-Bricks erected in England.
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Specially adapted for Siemens-Martin Gas-Furnaces; also for Gas, Copper, Iron, Steel, and other Furnaces where intense heat is required.
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IS AT THE

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This System is fully Patented, and any Infringer will be strictly proceeded against.

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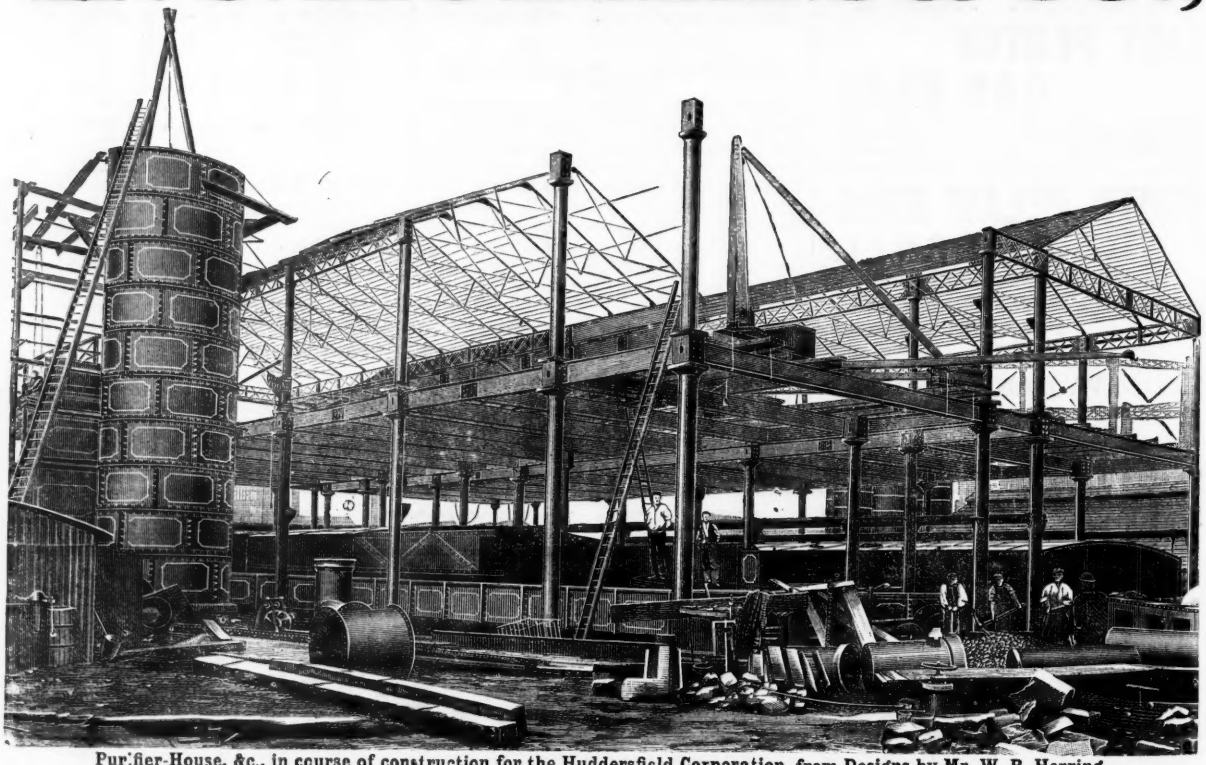
W. C. HOLMES & Co.,



Purifier-House, &c., in course of construction for the Huddersfield Corporation, from Designs by Mr. W. R. Herring.

Makers also of Retort Ironwork, Condensers, Patent Scrubber-Washers, Gasholders of all sizes, and Gas Plant of every description.

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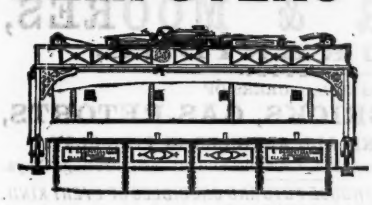

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(Wrought out of Holmside and South Moor Collieries.)

PRESENT production 4000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16½ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves about 70 per cent. of excellent Coke. To show the progress of HOLMSIDE COALS, it may be mentioned that the quantity carbonized by the London Gas Companies in 1885 was about 200,000 tons; whereas the present consumption of HOLMSIDE COALS in London alone is at the rate of nearly

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(YEADON AND ADGIE'S PATENTS)

POSSESS THE FOLLOWING ADVANTAGES OVER ALL OTHERS:—

1. Occupy only one-fourth the space of ordinary Carbonizing Plant.
2. Continuous Automatic process; Gas produced in 12½ minutes.
3. Produce 25 per cent. more Gas per Ton of Coal carbonized.
4. Richer Gas of 15 per cent. additional Illuminating Power.
5. Utilize the smallest size, therefore the lowest price, Coal.
6. Proportionate increase from large Coal when broken as for Stoking-Machines.
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8. No deposit of Carbon in Retorts, or choked Ascension-Pipes.
9. Fogs conquered by the production of Gaslight on five hours' notice.
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11. Retorts can be used for Revivifying Spent Lime in 20 minutes.
12. Revivify Spent Oxide for the recovery of Sulphur Compounds.
13. Sunday Ordinary Labour and Nightwork reduced 75 per cent.
14. Overwork and Overtime abolished; also Casual and Foreign Labour.

For Articles on and descriptive of the above Apparatus, see *Journal of Gas Lighting* for Dec. 13, 1892; March 7, April 25, May 2, and May 16, 1893. Also, the *Gas World*, Jan. 21 and May 6, 1893.

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Suitable for Suspension, or can be fixed to the ordinary Bracket in place of Burner.
Price of **Bracket Lamp, from 13s.**
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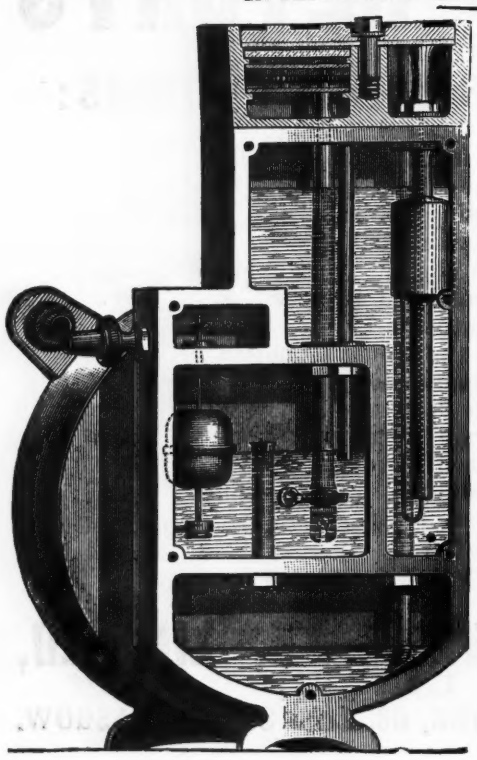
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Has been designed to obviate that which has hitherto prevented the general adoption of underground Meters—namely, their serious cost. No box is required, and the saving thus effected as compared with ordinary underground Meters, where either a box or meter-pillar is necessary, is fully one-half. The price of one for three lights is 28s., and the other sizes are correspondingly cheap. When fixed, the only part of the Meter exposed to view measures 6½ inches by 3½ inches. By the Indicator with which the Meter is fitted, the Inspector can at once discern whether water is required; but as the Meter is of the compensating description, water will probably need only be supplied ONCE A YEAR. It is advisable to fill the Meter with a non-freezing liquid, which does not injure the fittings; and this can be supplied at about 1s. 3d. per gallon.

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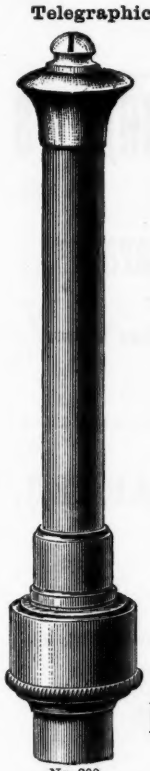

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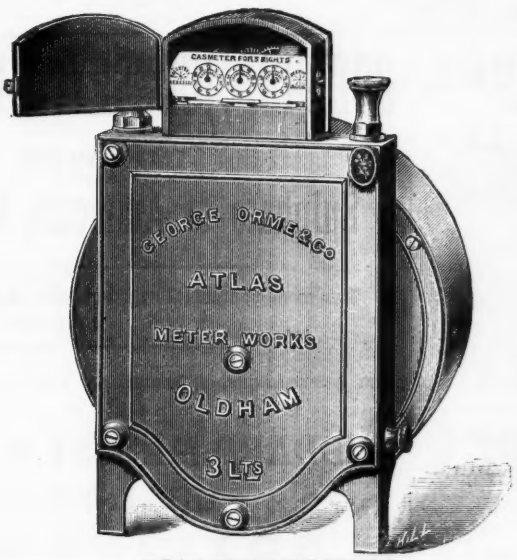

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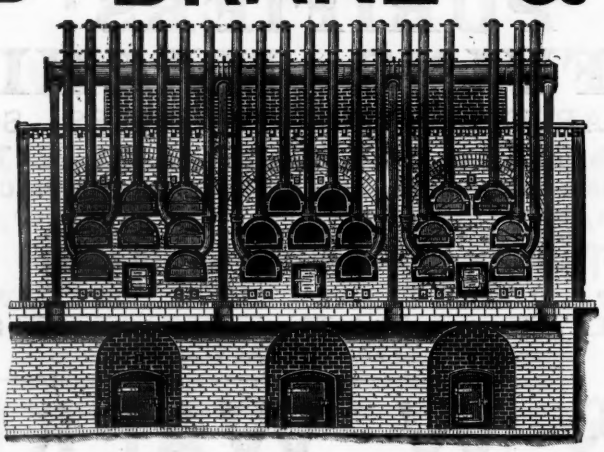

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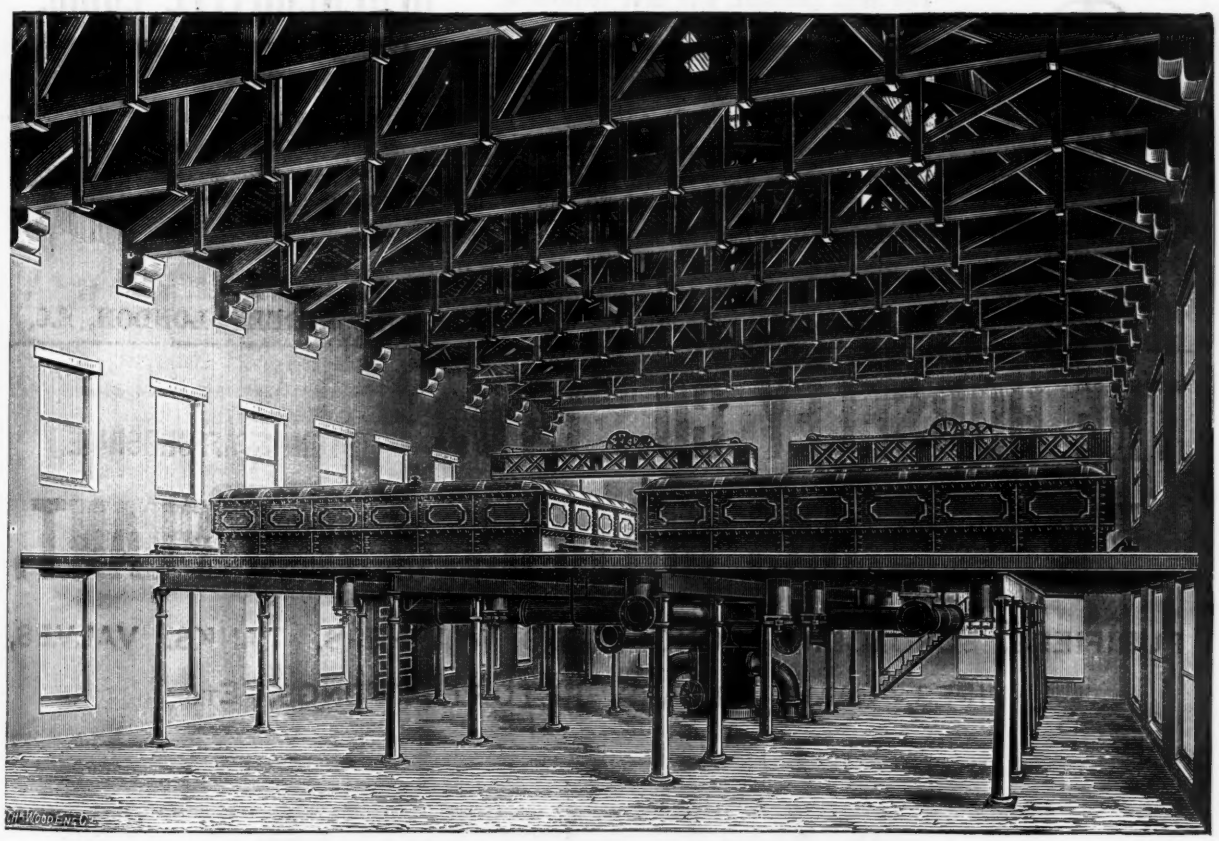

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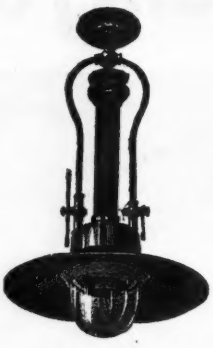

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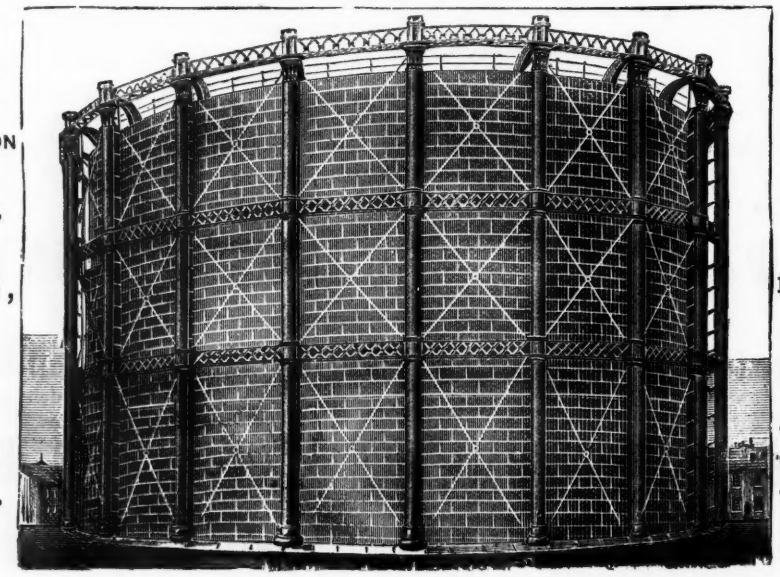

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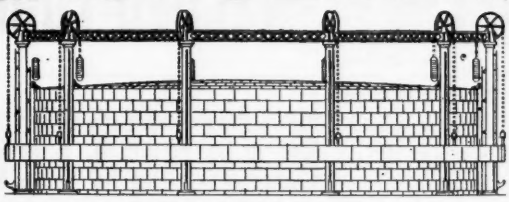

PRESSURE-REGULATORS FOR GASHOLDERS (See "JOURNAL" Dec. 20, 1892).

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The Pump of the future for quickly and economically moving large bodies of Water.

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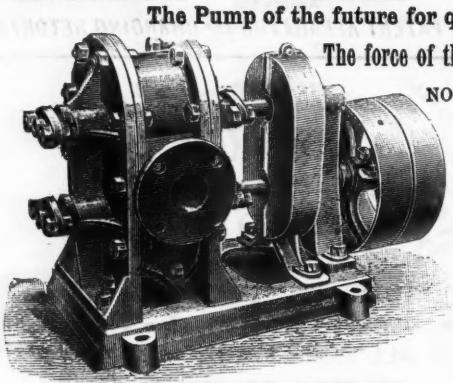

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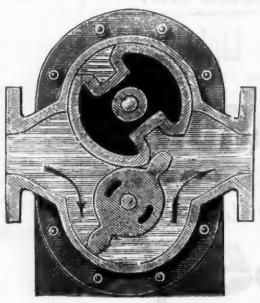

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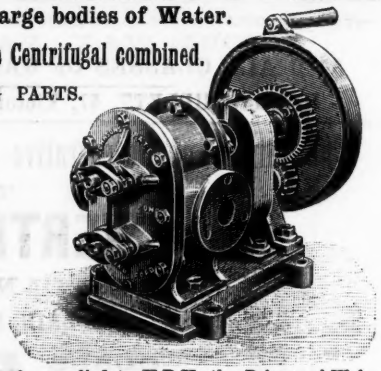

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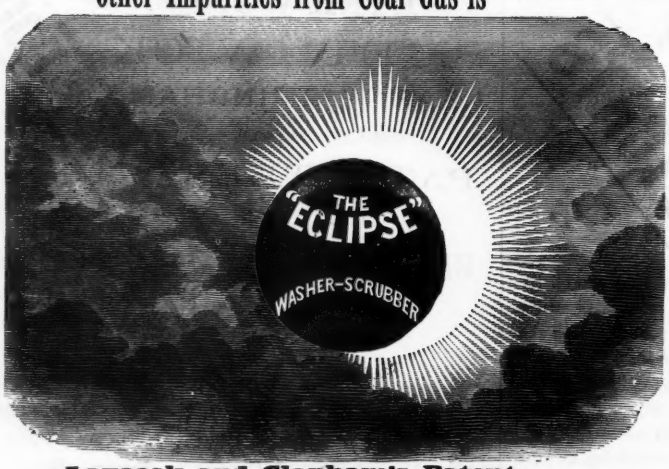

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The Patent Wooden Balls thoroughly break up the Gas; give an immense amount of freshly-wetted Surface; and do not clog or increase back pressure.

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